LECTURES

ILLUSTRATIVE OF

VARIOUS SUBJECTS

IN

PATHOLOGY AND SURGERY.

BY

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ADVERTISEMENT.

SINCE I ceased to give a complete and systematic
course of Lectures on Surgery and Surgical Patho-
logy in the year 1831, I have annually addressed a
limited number of Lectures on the same subjects
to the students of St. George's Hospital.

At different periods several of the last-men-
tioned discourses have appeared in print in one
or more of the weekly medical journals, and of
these a part are republished in the present
Volume ; having, however, undergone various
corrections, and received such additions as my
later experience, and more mature reflection, have
enabled me to furnish. If what I now offer to
their perusal should prove acceptable to the
Profession, I may venture to publish a Second
Series of my Lectures, as soon as I find the
necessary leisure for that purpose.

In the present collection I have included two
Lectures, forming part of a course which I deli-

vered as Professor of Anatomy and Surgery to
the Royal College of Surgeons of England more
than twenty years ago, and which had not been
published previously. They relate to subjects
of considerable interest, which are not very
distinctly treated of in surgical books ; and I
have hopes that they may afford some useful
information to the junior class of medical and
surgical practitioners.

17th February 1846.

CONTENTS.

LECTURE I.

ON THE STUDIES REQUIRED FOR THE MEDICAL PROFESSION.*

THERE are very few departments of human know-
ledge which may not be cultivated, with more or
less advantage, by those who are engaged in the
pursuit of the medical profession. The phenomena
of muscular action cannot be comprehended by
one who has paid no attention to the study of
mechanics. Without some acquaintance with the
phenomena and laws of light, you will in vain
endeavour to understand the physiology of the
eye, and the treatment of its diseases. The classi-
fication of the various textures of the body; the
changes produced in the animal fluids by respira-
tion and secretion; the composition and exhibition
of medicines; — these things must be altogether
mysteries to those who have not applied themselves
to chemistry. I cannot believe that any one is
really qualified to undertake the management of
cases of mania and imbecility of mind, who has
not studied the mind in its natural and healthy

* Addressed to the Students of the Medical School of
St. George's Hospital, October 1, 1838.

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state, and endeavoured to analyse his own intel-
lectual and moral faculties. The stores of medical
experience accumulated in former ages, and even
the comparatively modern works of Haller, replete
as they are with the most interesting anatomical
and physiological information, are of little avail
to those who have no knowledge of the dead
languages.

It is not however my intention, in this introduc-
tory discourse, to enlarge upon these topics. There
are some studies peculiar to the medical profession
to which, if you would do justice to the public, and
obtain honour for yourselves, you must be espe-
cially devoted : which you must prosecute, not
carelessly, and as a matter of form, but with zeal
and unremitting diligence, through the whole period
of what is called your education ; and some of
them also during the remainder of your profes-
sional lives. It is to the method of conducting
these important studies that I am now anxious to
direct your attention. My object is, in the begin-
ning of your professional career, to place you in
the right road ; and I trust that the observations
which I have to offer, founded as they are on
experience, and on an earnest desire for your
welfare, may not be unacceptable at the pre-
sent time, nor be found altogether useless in the
future.

In the practice of our art we undertake the cure
of disease ; and, in saying that we are to use our
best endeavours, honestly and conscientiously, for
the attainment of this object, we describe the
entire duties of a medical practitioner. But for the

cure of disease it is not sufficient that we should
understand the nature and application of remedies ;
we must study disease itself in all the variety of
forms under which it may present itself to our
notice. And this leads us to another order of
inquiries. Disease is the derangement of one or
more of the animal functions, in many instances
attended with an alteration in the structure of the
body ; and, if you would understand these sub-
jects, you must first make yourselves acquainted
with the structure and functions of the body in
its healthy state. Thus you will perceive what
are the three principal divisions of the course of
education in which you are now engaged. The
first comprehends the science of Anatomy and
Physiology ; the second that of Pathology, or
the science of disease ; and in the third division
we find whatever relates to Medical and Surgical
Treatment.

Let it always be borne in mind that this last is
the real object which you have in view. I address
you as future medical practitioners. If, taking ano-
ther course, you choose to study anatomy and
physiology, merely as interesting branches of human
knowledge, you are at liberty to do so, and you will
be as well rewarded for your labours as if you had
applied yourselves to geology, optics, or astro-
nomy. In like manner, if any one apply himself,
as a philosopher, altogether to the study of pa-
thology, he will find much in it that may interest
himself, and that may be useful afterwards to
those who carry their researches further. But as
medical practitioners, you must not stop at either

one or the other of these points ; and, never losing
sight of the ultimate object of all your investiga-
tions, you must estimate the value of whatever
other knowledge you acquire by the degree in
which you find it to be directly or indirectly appli-
cable to the healing art.

It is one advantage arising from the peculiar
constitution of the London medical schools, that,
with few exceptions, the instructions, which you
here receive, have, in a greater or less degree, a
tendency to practice. The ambition of the teacher
of anatomy is not limited to success in his present
vocation. He looks forward to the time when his
profession as a physician or surgeon will elevate
him to fame and fortune. His mind is naturally
directed to those inquiries, a proficiency in which
will most assist him in the attainment of these
objects ; and that which is useful to himself cannot
fail to be useful to his pupils. I have no doubt
that the praises which are bestowed on some of
the continental anatomists are well founded ; that
there are universities in which the anatomical pro-
fessors, devoting their whole time, and industry,
and intellect to this one pursuit, explain the mys-
teries of minute anatomy at greater length, and
with more precision, than the teachers here : but,
nevertheless, I assert that ours is the better method
with a view to the education of those who wish to
become, not mere philosophers, but skilful and
useful practitioners.

In like manner, pathology is not taught here as
a separate science, but you receive your instruc-
tions in it from the lecturers on the practice of

physic and surgery, who, while they explain the
changes of function or structure, which constitute
disease, point out also the symptoms by which the
existence of these changes is indicated in the living
body, and the means to be employed for the pa-
tients' relief. Thus while you are taught pathology,
you are taught also its uses and application ; and
these different subjects, brought under your view
at the same time, serve mutually to elucidate each
other ; for, while pathology assists you in obtaining
a knowledge of symptoms, the study of symptoms,
and of the operation of remedies, contributes in
no small degree to extend your knowledge of
pathology.

The education of a medical practitioner, for
whatever department of the profession he may be
designed, necessarily embraces a variety of sub-
jects. But it is extended over a space of at least
three years, and it is of great importance that you
should so arrange your studies that no excessive
and overpowering demand may be made on your
attention at any one period. And here let me
advise you to begin with a system of steady appli-
cation, and to adhere to it throughout. It is not
uncommon for medical students, any more than it
is for other students, to engage at first with zeal
in their pursuits ; then, as these lose the charm of
novelty, to become careless and indifferent, and at
last, when their education is drawing to a close,
and it becomes a question how far they are qualified
to undergo the required examinations, to endeavour
to make up for the time which has been mis-spent
and wasted by excessive labour, such as is incom-

patible with sufficient physical repose and mental
relaxation.   But it is not in this way that great
things are to be accomplished, either in our profes-
sion, or in any other.   Habits of attention which
are once lost are not easily regained; and no
durable impressions are made upon a mind which
is exercised beyond its powers.   The slow but
persevering tortoise reached the goal before the
hare, who was over-confident of the speed which
she could exercise if she were required to do so;
and this fable, which we were taught in the nursery,
conveys a moral lesson which the philosopher need
not be ashamed to learn.

The studies which will occupy the principal part
of your time are those of anatomy, and of the
hospital practice; and you cannot doubt as to
which of these has the claim of precedency.   I
will not say that a student who attends the wards
of the hospital in the beginning of his education,
may not thence obtain some sort of useful practical
knowledge; but it is plain that he can profit little
by it compared with one whose mind has been
prepared by a previous diligent attendance on the
anatomical lectures and dissecting-room.   The
attendance on anatomical lectures is necessary for
your initiation into the study of anatomy.   They
give you a general view of what you have to learn,
and are, at the same time, the source whence you
will derive your principal instructions in physio-
logy.   For anatomy and physiology are one
science, and to teach them separately is about as
absurd as it would be to divide astronomy into
two sciences, the one teaching the figure and size

of the heavenly bodies, and the other their motions.
But to be a good anatomist, the student must
labour in the dissecting-room ; he must unravel
the structures of the human body with his own
hands, and examine every thing for himself. The
impressions which dissection leaves upon his mind
not only are accurate, but they will be lasting ;
while, if he trusts to those which he receives from
the discourses and exhibitions in the lecture-room,
he will find them to be evanescent.

Such is the connection of the different parts of
the animal system, and so dependent are they on
each other, that it would be hazardous to regard
the knowledge of any one of them as altogether
useless. But there are some parts of which a
general knowledge is all that is required. It would
be an unprofitable waste of time to trace all the
artificial divisions which may be made of the deep-
seated muscles of the spine, or the varieties which
occur in the minute ramifications of the veins and
arteries. On the other hand, there are some
parts, such as the bones and muscles of the extre-
mities, the distribution of the principal nerves and
larger vessels, the structure of the viscera, which
cannot be too sedulously and minutely studied ;
and no one is fitted to undertake the practice of
operative surgery, who is not familiar with the
exact relative situation of the parts concerned in
surgical operations.

During the first season of your education, you
will find that the labour of acquiring a competent
knowledge of anatomy is such that you will have
but little time to bestow on other studies. The

few among you who have the opportunity of re-
maining in the schools during a period of five or six
years may do well to devote even two entire winters
to anatomy before they begin their attendance on
the hospital practice. But I cannot give this advice
to the majority of those whom I now address, and
whose period of education is more limited. And
here let me observe, that it is a great mistake to
suppose, after the first anatomical session is over,
that it is better for you to defer beginning your
attendance on the hospital until the next autumn.
You will, in fact, attend the hospital to greater
advantage during the summer than at any other
time. The same opportunities of experience pre-
sent themselves at the hospital at one period as at
another, and during the summer you can bestow a
more undivided attention on what there occurs
than you can during the winter.

While engaged in attendance on the hospital, al-
ways bear in mind that there is no one of your other
studies which, as to real importance, can compete
with this. The lectures on anatomy, chemistry,
materia medica, practice of medicine and surgery,
and midwifery, are nothing in themselves. They
are but the means to an end, and are valuable only
because without them you would be unable to learn
the symptoms and treatment of diseases in the hos-
pital. I feel it my duty to make this observation,
and to make it earnestly, because it appears to me
that the truth which it inculcates is not, for the
most part, sufficiently impressed on the minds of
medical students. Perhaps, however, if strict jus-
tice were done to all concerned, and we were to

trace this mistake to its origin, we should find that it belongs, not so much to the medical students themselves, as to those by whom their course of education is regulated, and who, by a false estimate of the importance of lectures, and an unnecessary multiplication of the number of them which the students are required to attend, have left an altogether insufficient time for a profitable attendance on the hospital.

Indeed it is not by going through the form of walking round the wards daily with the physician and surgeon that you will be enabled to avail yourselves of the opportunities of obtaining knowledge which the hospital affords. You should investigate cases for yourselves ; you should converse on them with each other ; you should take written notes of them in the morning, which you may transcribe in the evening ; and in doing so you should make even what are regarded as the more trifling cases the subject of reflection. Some individuals are more, and others are less, endowed by nature with the power of reflection ; but there are none in whom this faculty may not be improved by exercise, and whoever neglects it is unfitted for the medical profession.

You will at once be sensible of the great advantage arising from your written notes of cases. But that advantage is not limited to the period of your education. Hereafter, when these faithful records of your experience have accumulated, you will find them to be an important help in your practice ; when years have rolled over you, and the multitude

of intervening events has obscured the once bright
inscriptions on your memory.

Feeling as I do how essential it is, both to your-
selves and to the public, that your hospital studies
should be well conducted, I shall proceed to offer
some further observations on this subject.

In the first instance, your attention should be
directed more to the symptoms and progress of
diseases than to their treatment.   You should begin
with those of the simplest form, as the only means
of obtaining that elementary knowledge, without
which you will in vain endeavour to comprehend
the more complicated and difficult cases.   Carrying
with you into the wards of the hospital the know-
ledge which you have acquired in the dissecting-
room, you will, in each individual case, make these
inquiries :—What is the nature of the disease, con-
sidering it anatomically and physiologically, and in
what organ is it situated, or has it no distinct
locality ?   If these points can be satisfactorily
determined, you will, in most instances at least,
have discovered the bond of connection between
the various symptoms ; your subsequent investiga-
tion of the case will be rendered more simple ; and
you will be enabled to form a more distinct and
rational notion as to the treatment which is required
and the probability of a cure, than you could have
formed otherwise.   Do not be satisfied with having
learned the structure and functions of the body in
health, but attend the examination of those who
have died of their complaints ; and endeavour to
associate the symptoms which existed before death

with the morbid appearances observed afterwards. The more extended cultivation of morbid anatomy is one of the most peculiar features of modern times. It has laid the foundation of a more accurate system of pathology than that which existed formerly, and has led to many improvements in practice ; and it is right that your minds should be impressed with a just sense of its great value and importance.

Having said thus much, I trust that I shall not be considered as under-estimating these researches in the observations which follow. Morbid anatomy is not pathology, though it is an essential part of it. You may know all that is to be known of the former, and yet your knowledge of the latter may be very limited. To be a pathologist you must study disease in the living body even more than in the dead. Even in the instance of what we call local diseases, morbid anatomy does not teach us all that we ought to know ; but there are many diseases which, as far as we can see, have no absolute locality ; and what does it teach us there ? In cases of hysteria, gout, fever, and in a number of others which it would be easy to enumerate, the dissection of the dead body furnishes us with little else than negative information ; and in some cases, if we trust implicitly to it, morbid anatomy will prove a deceitful guide. Thus, in a patient who has died of continued fever, you find the mucous membrane and glands of the lower portion of the small intestine ulcerated. Your first impression might be that you had discovered the original malady of which the fever was symptomatic. It is

only by the investigation of the disease in the living person that you are enabled to satisfy yourselves that the ulcers were the consequence, and not the cause, of the fever. The mere morbid anatomist may suppose that in the inflammation of the œsophagus and trachea, he has discovered the essence and real seat of hydrophobia ; but a more extended observation teaches you that such inflammation is but a contingency ; and that, whether it exist in a greater or less degree, there will be the same fatal termination of the patient's sufferings. Then there is an extensive class of diseases in which we may say that there is actually no danger ; and of these morbid anatomy can teach us nothing although we may learn much respecting them, so as to understand their nature sufficiently well, by investigating them in other ways. We know as much of a sick headach as of pulmonary consumption ; as much of psoriasis and lepra as of small-pox and measles.

If you were to trust implicitly to what is taught in books and lectures, you would suppose that you must understand the nature of every case that you meet with, and be able to give it its appropriate appellation. But a very little experience in the hospital will teach you that it is not so in reality. No fault is to be attributed to authors and lecturers ; for if they were to attempt to teach the science otherwise, they could not teach it at all. But you must take care that you are not misled, and be prepared to meet with cases of which the nature is doubtful, and even with some which are absolutely unintelligible. Never allow your imagi-

nation on these occasions to supply the place of knowledge. It is something to be aware of our own ignorance, which time and observation and reflection may remove, but which is likely to be permanent if we think it necessary to offer a hypothetical explanation of every case which we do not, in the first instance, comprehend.

Although, as I have already observed, the symptoms and progress of diseases claim your first attention, yet you will soon discover that these cannot, in practice, be separated altogether from the study of the means to be employed for their relief; and you must, at an early period of your attendance at the hospital, endeavour to form some notion of the principles on which the latter is to be conducted.

The first question, then, which should present itself to you in the management of a particular case is this :—Is the disease one of which the patient may recover, or is it not ? There are, indeed, too many cases in which the patient's condition is so manifestly hopeless, that it is impossible for you to overlook it. Let me, however, caution you that you do not, in any instance, arrive too hastily at this conclusion. Our knowledge is not so absolute and certain as to prevent even well-informed persons being occasionally mistaken on this point. This is true, especially with respect to the affections of internal organs. Individuals have been restored to health who were supposed to be dying of disease in the lungs or mesenteric glands. But it is also true, though to a less extent, with respect to diseases of parts which are situated

externally. I know females who are now alive
and well, who were supposed to labour under
malignant disease of the uterus ; and I could men-
tion many cases in which patients have recovered
of what had been regarded as an incurable disease
of a joint. It is a good rule in the practice of
our art, as in the common affairs of life, for us
to look on the favourable side of the question,
as far as we can, consistently with reason, do so.
A sanguine mind tempered by a good judgment is
the best for a medical practitioner. Those who
from physical causes or habit are of a desponding
character will sometimes abandon a patient to a
speedy death, whom another would have preserved
altogether, or for a considerable time.

There is another inquiry which should be always
made before you determine on the adoption of a
particular method of treatment:—What will happen
in this case, if no remedies whatever be em-
ployed ? If the patient be left altogether to
nature, or to the efforts of his own constitution ?
There are many diseases, which, for the most part,
undergo a spontaneous cure, and we should be
always very cautious how, in such cases, we
disturb the natural process. A prudent physi-
cian watches a case of measles or small-pox, but
it is only on some special occasions that he
ventures to have recourse to any active remedies.
The surgeon ought to be influenced by similar
views in the management of the cases which come
under his care ; those, especially, in which the
patient suffers from the effects of mechanical
injury. The animal system is not like a clock

or a steam engine, which, being broken, you must
send to the clock-maker or engineer to mend it;
and which cannot be repaired otherwise. The
living machine, unlike the works of human in-
vention, has the power of repairing itself; it
contains within itself its own engineer, who, for
the most part, requires no more than some very
slight assistance at our hands. We bring the
edges of a wound into contact, but the vascular
union, which constitutes the healing by the first
intention, is the work of a higher art than any
that we profess to practise. If this mode of union
fails, and the wound is to be healed by granu-
lations, still this is not accomplished by our
means. So, where there is a simple fracture, all
that we can do is to place the two ends of the
bones in a proper position, and keep them in
it. The process by which they are made to
unite, so as to be again consolidated into one
bone, is not under our dominion and control.
These are, it is true, examples of slighter and
simpler injury; but even in those in which the
injury is more severe and complicated it is easy
for us to interfere to the patient's disadvantage,
and, in fact, it may be truly said, that there is,
on the whole, more harm done by too much
than there is by too little interference. A pa-
tient with a compound fracture of the leg, or a
wound of the knee-joint, stands a comparatively
bad chance of recovery, if the surgeon, in his daily
visits, disturbs the position of the limb, intro-
ducing his probe into the wounds and sinuses, and
dressing them to the bottom with lint. Wounds

of the brain are, as you must already know, highly dangerous, so that there is only a small proportion of recoveries among a great number of deaths from these accidents. I was once at the trouble of looking over all the cases of this kind which I could find recorded among my own manuscript notes, and in what might be regarded as standard books belonging to this part of surgery. I constructed a table, which represented, in every case, the kind of wound, the treatment employed by the surgeon as far as operations were concerned, and the results which followed; and it was curious to observe how large a proportion of the recoveries occurred in those cases in which the surgeon either avoided an operation altogether, or confined himself to the removal of some loose and detached pieces of bone. You may well suppose that a person who has a musket-ball lodged in the brain is in a very dangerous condition; nevertheless, it appears that it is safer to allow it to remain, than to endeavour to extract it.

I feel it my duty to give you these cautions. I should, however, be sorry if, in so doing, I were to lead you to over-estimate what nature can do, or to under-estimate the resources of our art. No one will probably be bold enough to tell you that surgery is useless; and none but the ignorant will hold this language respecting the sister art of medicine. You will not have been engaged for two months in visiting the bedsides of the patients in the hospital, without having ample means of contradicting this absurdity. I said that it is easy to interfere too much in the management of a case

of compound fracture: yet the life of a man who has met with such an accident has been frequently preserved by the surgeon seizing a fit opportunity to open a putrid abscess. I said that a prudent physician, called to a case of measles, will do little more than watch the progress of the disease where it proceeds favourably; but if symptoms of pneumonia show themselves, and blood-letting is not resorted to at a proper period, the death of the patient may be the consequence of such neglect. When I tell you that we are to trust to nature, I do not mean to say that we are to confide in her implicitly, but that our rule should be not to disturb her operations without an adequate reason for so doing; at the same time holding ourselves ready, where a just occasion presents itself, to step in to her assistance, and then act with promptness and decision.

You will soon learn that it is not equally easy, in all cases, to determine what is the mode of treatment most calculated to be useful to the patient. The disease may be simple and obvious, so that no doubt can be entertained respecting it; and we know if any remedies, which we possess, are capable of relieving it, and what they are; and, if it be not under the influence of remedies, we know that also. But in another case, the disease may be complicated, the complication being, most usually, of this kind;—that that which most attracts our notice is not the primary disease; but it is against this last, and not against the diseases that follow in its train, that our remedies are to be directed. Bearing this rule in your minds, you will understand many things that occur in the hospital,

which you could not have understood otherwise. A patient, for example, has his legs swollen from anasarca ; the skin tense, inflamed, and likely to give way and ulcerate, or even threatened with gangrene. We make punctures with a needle; the fluid escapes, the tension is relieved, the inflammation subsides. But the relief is only temporary. The swelling depends on an obstruction to the return of the venous blood from the limb, produced by disease elsewhere, probably at a considerable distance from the part to which our attention has been principally directed. To prevent a recurrence of the mischief in the legs, we must endeavour to remove, or, if that cannot be accomplished, to palliate, the original disease. Another patient suffers from inflammation of the synovial membrane, which lines the knee. The joint is painful, and distended with fluid. Perhaps we are told a history of some sprain ; but on inquiry it is evident that the accident was so slight, that it will not account for the symptoms. We have recourse to leeches, blisters, and liniments, and keep the limb in a state of repose ; but although somewhat mitigated, the inflammation still lingers in the joint. In fact, we have not yet traced the disease to its origin. On further inquiry we find that there is a faulty digestion, with flatulence and acidity of the stomach after meals, and a copious secretion of lithate of ammonia by the kidneys. In addition to our other remedies, we administer purgatives, magnesia, small doses of mercury, and perhaps colchicum, and the disease subsides.

Again, a case, whether simple or complicated, may be obscure ; so that we cannot well satisfy

ourselves what the symptoms indicate, or how
they are linked together. Here we can do nothing
better than consider what are, on the whole, the
most reasonable explanations which can be offered
of the circumstances of it; and without adopting
these explanations as realities, our practice must be
a series of experiments founded on them. If our
first experiment should not succeed, in our second
or third we may be more fortunate; and in the
meantime, every one of them probably gives us a
clearer insight into the disease, so that we may pro-
ceed with more confidence in our treatment of it.

But let us suppose another case. A disease is so
obscure, or so beset with difficulties, that we are
absolutely at a loss how to treat it, having nothing
to direct us in our practice. Here we may apply a
rule, which is also applicable to all the concerns of
life. When we know not what to do, it is better
that we should do nothing. Nature may accomplish
something for the patient; and if our efforts to
assist her are founded on no principle, they are
more likely to be mischievous than they are to be
useful.

It is almost proverbial among us, and I have
already expressed the same thing, though in other
words, that our object should be to seek remedies
for the disease, and not for the symptoms. But
there are few general rules which are not to be re-
ceived with some degree of limitation. Particular
symptoms may be so urgent, that we must endea-
vour to relieve them at all events, without reference
to the causes which produce them. You must,
under certain circumstances, puncture anasarcous

legs, although this does nothing for the primary disease. The pain of the tic douloureux is merely a symptom, probably indicating the existence of some kind of disease in the brain; but if the patient be distracted by excessive suffering, are we not to administer opium for his relief? A physician is called to a patient with a weak and fluttering pulse and cold extremities, who is, to use common language, in danger of sinking. He does not hesitate for one instant, to give him ammonia and brandy, without waiting to inquire about the original malady. If the *post-mortem* examination should afterwards disclose that some internal inflammation had been going on at the same time, there is nothing for him to regret; a knowledge of that circumstance would not have altered his practice in such an emergency as this.

So far the rules of practice seem to be sufficiently intelligible. But the great difficulty remains to be noticed :—How are you to determine what are remedies, and what are not, and the real value of the remedies which you possess? Here is the most abundant source of the errors which infest our art; from which even the most experienced and discerning practitioners are not altogether exempt; but which especially prevail among those who are deficient in experience or good sense. It is to the almost entire ignorance of the public, and especially of the aristocratic classes, as to the evidence which is necessary to establish the efficacy or inefficacy of a particular mode of treatment, that we are to attribute the reputation which is frequently obtained by empirics and other adven-

turers, who pretend to practice the art, without having learned the science, of medicine.

When the optician, in constructing an optical instrument, arranges his lenses and reflectors in a new order, his knowledge of the principles of optics enables him to predict the effect which will be produced, so that, except as to some minor circumstances, he can be scarcely said to be making an experiment. But there is no reason to believe that in the study of those varied and complicated phenomena, which are the subject of physiology and pathology, we shall ever arrive at that point which has been long since attained in optics, and some other branches of natural philosophy; and at all events, we are far distant from it at the present moment. Few greater benefits have been conferred on mankind than that, for which we are indebted to Ambrose Parey—the application of a ligature to a bleeding artery: but no knowledge which he possessed would have enabled him to say more than that it would be probably successful; and it was left for after-ages to demonstrate the principle on which it acts, and to explain the circumstances which may cause its failure. John Hunter, as you will hereafter learn, was led by his knowledge of the animal economy to propose a new method of treating aneurism; and it is impossible to estimate the number of lives which have been preserved by this discovery; yet it was but an experiment, of which even his philosophic mind could not, with certainty, predict the result. It must, however, be admitted that science pointed out the road to these inventions. But this cannot

be said of the great majority of the remedies which
you will see employed. Nothing that could be
known beforehand would lead you to expect that
ipecacuanha would operate as an emetic ; or that
opium would occasion sleep ; that quinine or
arsenic would cure the ague ; that inflammation
of the iris would yield to mercury ; or the gout to
colchicum. The invention of these, and of a mul-
titude of other remedies, is of accidental origin ; we
are indebted for our knowledge of them, for the
most part, to the observations of ignorant persons,
accumulated during a long series of ages ; and
the office of men of science is little else than to
study their effects minutely, and to learn the right
application of them. But even in doing this, the
greatest caution, and I may say scepticism, is
necessary to prevent you being continually guilty
of mistakes. I have already told you how many
diseases, if left to themselves, admit of a sponta-
neous cure. We see the surface of the body, and
we know by certain outward signs a good deal of
what takes place within ; but there is much of
which we know nothing, so that it is impossible
for us to take cognizance of all the circumstances
which may occur to modify the course, and alter
the termination, of a disease. If we trust impli-
citly to the instinct which inclines us to believe
that when one event follows another, the first is
the cause, and the second the effect, we shall be
frequently directed wrong. The fact of a patient
having recovered under a particular mode of treat-
ment, goes but a little way towards establishing its
value ; nor is anything sufficient for this purpose,

short of the same result being obtained in many similar cases, in which there was otherwise little prospect of recovery. It is the disposition of every one of us to admit the efficacy of the remedies which we employ on insufficient evidence ; and unless we, whose duty it is to understand these subjects, are on our guard against this not unnatural prejudice, we have little right to blame the credulity of those whose minds are not turned to these inquiries, when a corresponding error of judgment leads them to believe in the absurdities of metallic tractors, animal magnetism, and homœopathy !

But there are still further considerations, which must not be overlooked in this part of our inquiry. It is not enough that you should have satisfied yourselves, by your own observations, or by those of others, as to the efficacy of a particular remedy in a particular disease ; you must look further still, endeavouring to learn what such a remedy may do besides. That which is usually an agent for good, may, under certain circumstances, be an agent for evil also ; and as the habits and constitutions of individuals differ, so it is not always in your power to foresee which influence will predominate. Each individual case must be separately and carefully studied, while under treatment, and with a view to its treatment, as much as with a view to a true diagnosis in the first instance. Arsenic is a remedy for *lepra*. Most persons can take it in the doses necessary for the cure of that disease, without experiencing the smallest inconvenience from it ; but, in some, a very moderate dose will operate as a

poison. Here, by watching its effects, you will always be enabled to discontinue it in time to prevent any ill consequences arising from it; and the fact of it disagreeing with one person does not therefore prevent you giving it to another. But in other cases, the circumstance of a method of treatment which is generally useful being occasionally injurious, is a sufficient reason for you to lay it aside altogether. A late eminent surgeon proposed the ligature of the principal vein on the inside of the leg, as a remedy for varicose veins and ulcers of the limb. For some time the operation seemed to be attended with the best results; but ultimately it was ascertained that inflammation of the membrane lining the vein occasionally followed. Such inflammation, when once established, is often uncontrollable, and always highly dangerous; and the possibility of its occurrence is more than sufficient to counterbalance all that can be said in favour of the operation.

I fear that, in my anxiety to give a right direction to those studies, which, as I believe, constitute the most important part of your education, I am already beginning to exceed the brief limits of a lecture. There is, however, one other subject which will not detain you long, and on which, before we part, I feel it my duty to offer a few remarks.

As medical students, you have little leisure for reading; you must, however, be provided with some good systems of anatomy and physiology to assist you in the dissecting-room; and you will find some of the best modern compilations relating

to medicine and surgery useful when you begin your attendance on the hospital. There are some few books which you ought carefully to peruse. I leave it to the different lecturers to point out what they should be ; but I shall take upon myself to mention, as one of them, the Treatise of John Hunter on the Blood and Inflammation. It is true that the essential parts of John Hunter's doctrines as to inflammation and its consequences are now so incorporated with what is taught in the schools, that to be acquainted with them you need not seek them in his works ; but I recommend you, nevertheless, to make these your especial study, for the sake of the other valuable information which they contain, and the important views in physiology and pathology which, in almost every page, are offered to your contemplation ; and also for this reason, that they will improve your faculty of observation, and furnish you with materials for reflection during the remainder of your lives.

During the latter period of your attendance on the hospital, and afterwards, when first engaged in practice, you should be provided with what may be regarded as the standard works on pathology, medicine, and surgery. Not that I mean much to recommend a course of medical reading, which for practical purposes is nearly useless. Books should be had recourse to chiefly for the purpose of reference, when circumstances have brought a particular subject under your observation. And here I must advise you not to confine yourselves within the narrow bounds of modern publications ; an error which is, I fear, too common, at present, not

only with medical students, but with practitioners.
It is true, that within the last fifty years a vast
impulse has been given to our sciences; but it is
equally true that they were cultivated not unsuc-
cessfully before.   There is no richer mine of sur-
gical knowledge than that which is contained in
the memoirs of the French Academy of Surgery;
and, as far as I know, there are no descriptions of
disease more accurate and graphic than those which
have been bequeathed to us by Sydenham.

Although many years have since elapsed, it
seems to me but as yesterday, when I was, as
you are now, a young adventurer in this great
Metropolis; and I well remember how often, in
the intervals of my occupations, I have contem-
plated, with something like dismay, the prospect
which lay before me.   My own feelings, at that
time, explain to me what may possibly be yours at
the present period.   Yet you have undertaken
nothing which energy and perseverance, and up-
right and honourable conduct, will not enable you
to accomplish.   It cannot, indeed, be predicated of
any individual to what exact extent he may attain
professional success, for that must depend partly
on his physical powers, partly on the situation in
which he is placed, and on other contingencies:
but having had no small experience in the history
of those who have been medical students, I venture
to assert that no one who uses the means proper
for the purpose, will fail to succeed sufficiently to
gratify a reasonable ambition.   You have entered

on pursuits of the highest interest, in which you will have the no small satisfaction of knowing that you never acquire any real advantage for yourselves which is not the consequence of your having benefited others. It is true that you have years of constant exertion before you; but you will eventually learn how preferable such a situation is to that of those individuals who, born to what are called the advantages of fortune, but neglecting the duties of their station, believe that they can direct their minds to no more worthy object than the multiplication of their selfish enjoyments. It will not be your lot, as it is often theirs, to suffer the miseries of ennui, or to be satiated and disappointed with life at an early period; nor will you have to regret, as you advance in age, that you have lived unprofitable members of society. It is also true that you will meet with difficulties in your progress;—but there is no higher gratification than that of surmounting difficulties; and whenever they occur you will be cheered by the anticipation of that period when you may look on past events, and say to yourselves —

> " Multa dies variusque labor mutabilis ævi
>   Retulit in melius."

LECTURE II.

ON THE DUTIES AND CONDUCT OF MEDICAL STUDENTS AND PRACTITIONERS.*

A LARGE proportion of those whom I now address are assembled, for the first time, for the purpose of pursuing their studies in the Medical School of this hospital; and their feelings on this occasion are not unknown to me; for, to a great extent at least, they must be such as I myself experienced, when long ago I was situated as they are at the present moment. Transplanted, perhaps, from some small community into this great city; the largest, the most populous, the richest, that ever flourished; jostled in crowded streets; surrounded by palaces, where the high-born and the wealthy, where the most eminent statesmen, the most distinguished in literature, in sciences, and arts, and in every other human pursuit, are, as it were, fused into one mass to make the London world; contemplating the novel scene around you, but being not yet identified with it; it cannot be otherwise than that a sense of loneliness should come upon you in the intervals of excitement; that you should say, " What am I in the midst of so much bustle,

* Addressed to the Students of the Medical School of St. George's Hospital, October 3, 1843.

activity, and splendour? who will be at the pains
to watch the course of a medical student? who will
know whether I am diligent or idle, or bear tes-
timony in after-years to the correctness or irre-
gularity of my conduct during this brief period of
my life?"

But let not your inexperience lead you into so
great an error. Even now, when you believe that
no one heeds you, many eyes are upon you.
Whether you are diligent in your studies; striving
to the utmost to obtain a knowledge of your pro-
fession; honourable in your dealings with others;
conducting yourselves as gentlemen; or whether
you are idle and inattentive; offensive in your
manners; coarse and careless in your general de-
meanour; wasting the precious hours, which should
be devoted to study, in frivolous and discredit-
able pursuits : all these things are noted to your
ultimate advantage or disadvantage; and ulti-
mately you will find that it is not on accidental
circumstances, but on the character which you
have made as students, that your success as prac-
titioners, and as men engaged in the business of
the world, will mainly depend. By the time that
you are sufficiently advanced for your lot in life to
be finally determined, the course of events will
have wrought mighty changes among us. Of those
who are now the most conspicuous in station, and
the most influential in society, many will have
altogether vanished from the scene of their former
labours; and others will be to be found only in the
retirement of old age. Younger and more active
spirits, your own cotemporaries, and those a little

older than yourselves, will have occupied their places ; and the tribunal, by which you will be judged of hereafter, will be composed of a different order of individuals from those to whose favourable opinion you would be most anxious to appeal at the present moment.

But I should be sorry if I were misunderstood as representing this to be the only, or the principal motive, which should lead you to avail yourselves to the utmost of your present opportunities. The knowledge which you will obtain as students is to be the foundation of the whole of that which many years of professional practice will afford you afterwards ; and, if the foundation be insecure, the superstructure will be of little value. However imperfect may be the sciences belonging to the healing art, to bring them even to their present state has been the work of centuries. The industrious student may enter on the active pursuit of his profession with a scanty store of knowledge compared with that of which he will find himself possessed twenty years afterwards ; but he is in the direct road to greater knowledge. He has the advantages of principles which have been established by the labours of many preceding generations ; and this will render the subsequent efforts of his life comparatively easy. But he, who has neglected his education, must, as it were, begin anew ; and he will find, when it is too late, that no combination of energy and talent will enable him to rise to the level of those, who were, in the beginning, his more diligent competitors. He will, moreover, labour under another and still greater disadvantage.

One business of education is to impart knowledge ; but another, and still more important one, is to train the intellectual faculties. To acquire the habit of fixing the attention on the object before you ; of observing for yourselves ; of thinking and reasoning accurately ; of distinguishing at once that which is important from that which is trivial ; all this must be accomplished in the early part of life, or it will not be accomplished at all. Nor is the same remark less applicable to qualities of another order ; integrity and generosity of character ; the disposition to sympathize with others ; the power of commanding your own temper ; of resisting your selfish instincts ; and that self-respect, so important in every profession, but especially so in our own profession, which would prevent you from doing in secret what you would not do before all the world ; these things are rarely acquired, except by those who have been careful to scrutinize and regulate their own conduct in the very outset of their career.

It cannot be too often brought before you, nor too earnestly impressed upon your minds, that being, in the present stage of your journey through life, in a great degree released from responsibility to others, your responsibility to yourselves is much increased. Your future fortunes are placed in your own hands ; you may make them, or mar them, as you please. Those among you, who now labour hard in the acquirement of knowledge, will find that they have laid in a store which will be serviceable to them ever afterwards. They will have the satisfaction of knowing that, in practising their art

for their own advantage, they are, at the same time, making themselves useful to their fellow-creatures; when they obtain credit, they will feel that it is not undeserved; and a just self-confidence will support them even in their failures. But for those who take an opposite course, there is prepared a long series of mortifications and disappointments. Younger men will be placed over their heads. Even where their judgment is correct, they will themselves suspect it to be wrong. With them, life will be a succession of tricks and expedients; and if, by any accident, they should become elevated into situations for which they have not been qualified by previous study, they will find that this is to them no good fortune; the world will always compare them with better persons, and the constant anxiety to satisfy others, and to keep themselves from falling, will destroy the comfort of their existence. Whether it be in our profession or any other, I know of no individuals much more to be pitied than those whom fortuitous circumstances have lifted into places, the duties of which they are not well qualified to perform.

I trust that none among you will suspect that these observations are founded on any theoretical view of the subject, or that it is merely as a matter of course that I thus address myself to younger men. I wish to see those who are educated in this hospital, an institution to which I am indebted for so many advantages which I have possessed in life, go forth into the world useful and respectable members of an honourable and independent profession. I wish to see them obtain success, and

worthy of the success which they obtain; and
having now had a long experience in the history of
medical students, and having been careful to watch
their progress through life, I am satisfied that the
only method by which this can be accomplished
is that which I have pointed out. And, I may add,
that I have never known an individual, who thus
applied himself seriously and in earnest to his task,
whose exertions were not rewarded by a reasonable
quantity of professional success—such as would be
sufficient to satisfy any but an inordinate ambition.
Beyond this, your lot in life may indeed be influ-
enced by circumstances not altogether under your
control.   Accident may place one individual in a
situation more favourable, and another in a situa-
tion less favourable to his advancement.   One may
have the advantage of greater physical powers,
enabling him to undergo the same exertion with
less fatigue, and to preserve his energies unim-
paired, where those of another would be exhausted;
and, in like manner, one may have the advantage
of powers of intellect which are denied to his com-
petitors.

With respect, however, to the last-mentioned
subject, I have no doubt that the difference is not
so great as you, or the world generally, may sup-
pose it to be.   There are few persons who have
not some talent, which, if properly cultivated, may
be turned to good account, and he who is deficient
in one kind of talent may excel in another.   But
the greatest talents may be wasted.   They may be
blighted by indolence; they may be used for base
or improper purposes; or they may be directed to

too great a variety of objects. It is well indeed
for you to have some diversity of study, so as to
keep all your mental faculties in wholesome exer-
cise ; so that you may not be without some sym-
pathies with those around you, and that you may
avoid the evils of narrow-mindedness and prejudice ;
still, whoever would be really useful in the world,
and be distinguished in it, must act to a great
extent on the principle of concentration, keeping
one object especially in view, and making his other
pursuits subservient to it. And let no one sit
down in despair and say, " I have not the abilities
of my neighbours, and it is needless for me to
exert myself in competition with them." If you
would know what your own powers are you must
try to use them. Industry is necessary to their
developement ; and the faculties of the mind, like
those of the body, go on improving by cultivation.
It is impossible for you to form a right estimate of
yourselves in early life, nor can you be rightly
estimated by others. The self-sufficient, who do
not keep before their eyes an ideal standard of
perfection, who compare themselves only with
those who are below them, will have an advantage
with inexperienced and superficial observers ; but I
must say that I have never known any one to do
any real good in the world, or obtain ultimately a
bright reputation for himself, who did not begin
life with a certain portion of humility. The
greatest men are humble. Humility leads to the
highest distinction, for it leads to self-improvement.
It is the only foundation of a just self-confidence.
Study your own characters ; endeavour to learn,

and to supply your own deficiencies ; never assume to yourselves qualities which you do not possess ; combine all this with energy and activity, and you cannot predicate of yourselves, nor can others predicate of you, at what point you may arrive at last. " Men," says M. Guizot, " are formed morally " as they are formed physically. They change " every day.   Their existence is always under- " going some modification. The Cromwell of 1650 " was not the Cromwell of 1640.   It is true that " there is always a large stock of individuality : " the same man still holds on ; but how many " ideas, how many sentiments, how many inclina- " tions have changed in him !   What a number of " things he has lost and acquired ! Thus, at what- " ever moment of his life we may look at a man, " he is never such as we see him when his course " is finished."   These eloquent and philosophical remarks, made by the present Prime Minister of France, are not more applicable to those who are engaged in politics, than they are to those who are engaged in the pursuits of private life, and to none more than to yourselves.

It is not my intention on this occasion to give you any advice as to the detail of your studies. It is best that this should be left to your respective teachers.   They will tell you what lectures you should attend first, what afterwards ; what hours you should devote to anatomy, what to the hospital practice ; where you should take notes, and where you need not do so.   There are, however, some general suggestions, which I may venture to offer, without exceeding those bounds to which I wish

that my observations should be restricted, and without taking on myself those duties which more properly belong to others.

The first effect usually produced on the mind of a medical student, is that of being bewildered by the number and variety of subjects to which his attention is directed. In one class-room he is instructed in chemistry; in another, in the materia medica. In one place, the structure of the human body is unravelled before him; and in another, he contemplates the interminable varieties of disease, and the methods which are adopted for their cure. He sees none of the relations by which these different investigations are combined together, so as to form one science. He has the opportunity of learning a great number of facts, but for the most part they are insulated, and independent of each other; he can reduce them to no order, and the want of a proper arrangement and classification makes the recollection of them difficult and uncertain. But this is not peculiar to medical students. The same difficulty occurs to every one, who enters for the first time on an extensive field of research; and they must indeed be very indolent, and very unfit for the business of life, who suffer themselves to be disheartened by it. Have patience for a while; keep your attention fixed on the matters which are brought before you, and after every lesson that you have received, or at the close of every day, endeavour to recollect what you have seen and heard, and in the course of a short time there will be an end of the confusion; the mist which there was before you will have passed away;

where every thing had been obscure there will be
a clear landscape ; and the studies, which, when
you were first initiated in them, were dry and
irksome, will become interesting and agreeable.
As you acquire a more extensive knowledge of
individual facts it must necessarily happen that the
relations which they bear to each other will become
more distinctly developed. This, however, does
not seem to be the whole explanation. I cannot
well understand what I have observed to happen
in myself, without supposing that there is in the
human mind a principle of order which operates
without the mind itself being at the time conscious
of it. You have been occupied with a particular
investigation ; you have accumulated a large store
of facts ; but that is all : after an interval of time,
and without any further labour, or any addition to
your stock of knowledge, you find all the facts
which you have learned in their proper places,
although you are not sensible of having made any
effort for the purpose.

In the commencement of your studies, you will,
at first, be altogether occupied in the acquirement
of knowledge communicated to you by others.
You will learn from lectures and from books what
others have learned before you, and what is there
taught you must take for granted to be true.
A student may be very diligent and industrious,
and yet go no farther than this through the whole
period of his education. He may become an
accomplished person ; full of information ; a walk-
ing cyclopædia ; and, at the end of his labours,
may obtain the reputation of having passed through

his examinations with the greatest credit. All this
is as it should be, and those who think that to pass
a creditable examination is the only object of their
studies will be quite satisfied with the result. But
is it sufficient in reality ? Are no qualifications
required, besides those which are wanted for your
examination ? It is far otherwise, and no one will
rise to be conspicuous in his profession, nor even
to be very useful in it, whose ambition is thus
limited. The descriptions of disease, and the rules
of treatment, are simplified in lectures and in
books ; and if not so simplified, they could not
be taught at all. But you will find hereafter, that
disease is infinitely varied ; that no two cases
exactly, and in all respects, resemble each other,
and that there are no exact precedents for the
application of remedies. Every case that comes
before you must be the subject of special thought
and consideration ; and, from the very beginning
of your practice, although what is taught in lec-
tures and books may render you great assistance,
you will be thrown, in no small degree, on your
own resources. There is no profession in which it
is more essential that those engaged in it should
cultivate the talent of observing, thinking, and
reasoning for themselves, than it is in ours. The
best part of every man's knowledge is that which
he has acquired for himself, and which he can only
to a limited extent communicate to others. You
will spend your lives in endeavouring to add to
your stores of information ; you will, from day to
day, obtain a clearer and deeper insight into the
phænomena of disease ; you will die at last, and

three-fourths of your knowledge will die with you;
and then others will run the same course.   Our
sciences are, indeed, progressive; but how much
more rapid would their progress be, if all the know-
ledge that experience gives could be preserved.
Now, these remarks are of practical importance to
you all.   You should begin to act upon them at
an early period of your studies.   Make out every
thing relating to the structure of the body for
yourselves.   Do not altogether trust to what is
told you in lectures and books, but make the
knowledge your own by your own labours.   Ob-
serve for yourselves the phænomena of disease, and
the only way of doing this in an efficient manner
is to take your own written notes of cases : (I say,
your own notes, for copying those taken by others,
as far as the improvement of your own minds goes,
is nearly useless) and when you have taken notes
in the morning, write them out in the evening, and
think of them, and compare them with one another,
and converse on them with your fellow-students,
and all this will render the investigation of disease
a comparatively easy matter afterwards.

In these latter observations, I have anticipated
some of those which I had intended to address
especially to those among you who are on the
point of offering themselves to the public as can-
didates for practice.   It would be a fatal error for
you to suppose that you have obtained the whole,
or even any large portion of the knowledge which
it is necessary for you to possess.   You have not
done much more than learn the way of learning.
The most important part of your education remains;

—that which you are to give yourselves, and to this there are no limits. Whatever number of years may have passed over your heads, however extended may be your experience, you will find that every day brings with it its own knowledge; you will still have something new to seek, some deficiencies to supply, some errors to be corrected. Whoever is sufficiently vain, or sufficiently idle, to rest contented, at any period of his life, with his present acquirements, will soon be left behind by his more diligent competitors. By the young practitioner, every case that he meets with should be carefully studied; he should look at it on every side; and he should, on all occasions, assist his own inquiries by a reference to his notes of lectures and to books.

But it will rarely happen, that, in the beginning of a professional life, even the most diligent and the most successful person will be able to occupy the whole of his time with strictly professional pursuits; and the question must arise, " What is he to do with his leisure hours ? " A most important question indeed it is; for the character and the lot of the individual must depend, in a very great degree, on the way in which such leisure hours are employed. If altogether devoted to what, dull as they generally are, the world calls amusements, these do but spoil the mind for better things; and if you trust to such desultory occupations as accident may bring, the result will be no better. You will be the victims of melancholy and *ennui ;* an unreasonable despondency with respect to your future prospects will oppress your faculties, and deprive you of that

spirit, and of those energies, which are absolutely necessary to your success. And these evils are easily avoided. How many branches of knowledge there are, which, if not directly, are indirectly useful in the study of pathology, medicine, and surgery! and all general knowledge, whether of literature, or of moral or physical science, tends to expand the intellect, and to qualify it better for particular pursuits. There is no excuse for a young professional man, who does not devote some portion of his time to the general cultivation of his mind. His own profession have a right to expect it of him, and he owes it to his own character. Ours is no political profession. It is one belonging altogether to private life. Your place in society depends, not on your being mixed up with parties and factions, not on circumstances external to yourselves, but on your own qualities; you make it for yourselves. You wish, I conclude, to be received in society as being on a footing with well-educated gentlemen. But, for this purpose, you must be fitted to associate with them; and this cannot be the case, if you know nothing of those matters, which are the general subject of conversation among them. The world care little about those distinctions, which, for the sake of a more convenient division of labour, we make among ourselves; and a well-conducted and well-informed man will be just as well received in society if he belongs to one grade of the profession as if he belongs to another. It is very much to the discredit of the great medical institutions in this country, that, except in some few instances, they have not given even an indirect encourage-

ment to the obtaining a good general education, and in one instance, the Legislature have actually done their best to throw an impediment in the way. I know that many, nevertheless, have not been without this advantage; but they may improve themselves still further, and others may, in a great degree, make up for what they have lost by a right disposal of their time in the early part of their practice.

It cannot be difficult for any one endowed with an ordinary degree of intelligence and curiosity, to fill up his vacant hours with pursuits that are no less interesting than useful. But your profession itself, from the moment that you are established as practitioners, will possess a new interest very different from that which belonged to it during the period of your pupillage. Hitherto you have been acting under the direction of others, and on their responsibility. Hereafter, you will have to act for yourselves, and on your own responsibility. Whatever credit is to be obtained, it will be your own; and, on the other hand, where blame is due, you may be sure that no one will volunteer to divide it with you. In every case that comes under your care, you will have to account to your own conscience for having done the very best that it was in your power to do for your patients' welfare; you will have to account also to others; to your own immediate circle of friends and patients; to society at large; to all those whose favourable opinion of your character and conduct is necessary to your success in life. You will find yourselves surrounded by duties, responsibilities, and anxieties, which

were unknown to you as students.   He who has
not a full sense of the responsibilities which it
involves, is unfit for our profession ; and the anxie-
ties of a professional life are but a wholesome sti-
mulus to diligence and exertion.   I say this, sup-
posing them to be kept within reasonable bounds.
You may allow your thoughts to dwell on subjects
of anxiety until an entirely opposite effect is pro-
duced, and life is rendered miserable, and the mind
enervated.   Such a morbid sensibility is as mis-
chievous on the one hand, as a want of just sensi-
bility is on the other.   You must be careful to
train the mind so that it may not fall into either
of these extremes.   Make every exertion to obtain
knowledge, and to use it properly ; and then keep
it in your recollection that there are bounds to
human knowledge, and to human powers ; and
that, in the exercise of our art, we cannot do all
that is required of us ; for, if we could, pain and
misery would be banished from the world, man
would be immortal, and the order of the universe
would be disturbed.   Do not begin life with ex-
pecting too much of it.   No one can avoid his share
of its anxieties and difficulties.   You will see per-
sons who seem to enjoy such advantages of birth
and fortune, that they can have no difficulties to
contend with, and some one of you may be tempted
to exclaim, " How much is their lot to be preferred
to mine ! "   A moderate experience of the world will
teach you not to be deceived by these false appear-
ances.   They have not your difficulties, but they
have their own ; and those in whose path no real
difficulties are placed will make difficulties for

themselves; or, if they fail to do so, the dulness and monotony of their lives will be more intolerable than any of those difficulties which they may make, or which you find ready made for you. Real difficulties are much to be preferred to those which are artificial or imaginary; for, of the former, the greater part may be overcome by talent and enterprise, while it is quite otherwise with the latter. Then, there is no greater happiness than that of surmounting difficulties; and nothing will conduce more than this to improve your intellectual faculties, or to lighten the labours, and smooth the anxieties of life afterwards.

To be prepared for difficulties; to meet them in a proper spirit; to make the necessary exertion when they occur; all this is absolutely necessary to your success, whatever your profession or your pursuit in life may be. No one can be useful to others, or obtain real credit for himself, who acts on any other rule of conduct. But it is more easy to lay down the rule than to follow it, unless the mind be disciplined for the purpose from the beginning. The natural tendency of mankind is to indolence; to shrink from difficulties; to try to evade them, rather than to overcome them. Never yield to this disposition on small occasions; and thus you will acquire a habit which will enable you to do what is wanted on great occasions, without any violent or painful effort. It is by neglecting their conduct in the smaller concerns of life, that so large a portion of mankind become unequal to the performance of their higher and more important duties. If you would know a man's character, look

at what he does in trifles, and, for the most part, you will be able to form no inaccurate notion of what he would be in greater things.

The following anecdote is related of a distinguished individual, who afterwards rose to the highest honours of the legal profession. For several years, in the early part of his life, he had been wholly without professional employment. One term went and another came, but that which brought briefs to others brought none to him. Still he was always at his post, and, disappointed but not discouraged, he continued to labour, laying up stores of knowledge for his future use. At last, it happened that he was employed as a junior counsel in a cause of great importance. The evening before the cause was to come on in the court in which he professed to practise the senior counsel, or (as he is technically called) his leader, was seized with a sudden illness. No one of the same standing could be found to supply his place, and late in the evening the solicitor went, probably unwillingly enough, to the junior counsel, and represented to him under what circumstances he was placed, and that he must trust to him alone. All the hours of the night were devoted to the task. The knowledge which the poor obscure student had acquired now turned to good account. On the following day he gained such credit that his reputation was established, and from this time his elevation was rapid. Now this may perhaps be regarded as an extreme case, but something like it must happen to every one who attains a high station afterwards. There are few so indolent that

they will not make an exertion for the sake of an
immediate reward ; but it is a poor spirit than can
accomplish no more than this. The knowledge
which you acquire to-day may not be wanted for
the next twenty years. You may devote whole
days and nights to study, and at the end of the
year may not be aware that you have derived the
smallest advantage from it. But you must per-
severe nevertheless, and you may do so in the full
confidence that the reward will come at last. There
is nothing in which the difference between man and
man is more conspicuous than it is in this ; that
one is content to labour for the sake of what he
may obtain at a more advanced period of his life,
while another thinks that this is too long to wait,
and looks only to the immediate result. At first,
the former may seem not only to make no greater
progress than the latter, but even to be the more
stationary of the two. But wait, and you will find
a mighty difference at last. You cannot judge from
the first success of a professional person what his
ultimate success will be ; and this observation
applies especially to those who contend for the
greater prizes, not only in our profession, but in
the majority of human pursuits.

A thorough determination to attain an object is
the first step towards its attainment. If you wish
to advance yourselves in the way of life which you
have chosen, you must persevere in one undeviating
course, wandering neither to the right nor to the
left, or making such excursions as you make into
other regions of knowledge subservient to your
main pursuit. What is called a life of pleasure is

incompatible with a life of business; and those who have a more noble ambition, who love know-ledge for its own sake, must learn to limit their ambition, and not waste their talents or their repu-tation by grasping at too much. Those who would excel in all things, will excel in nothing. They may excite the wonder of the educated and un-educated vulgar; but the persons best qualified to judge will detect their weakness, and smile at their superficial acquirements; and, after all their labour, they will die at last, and leave the world no better than it would have been if they had never existed.

And here I can conceive that some among you may say, " Is there anything which the medical profession can bestow, which will prove a com-pensation for the labour, the exertion, and the sacrifices which it entails upon us? Is it better to continue in it, or to turn aside to some other pur-suit or employment?" Indeed, it is well that this question should be thoroughly considered before it is too late; for, as far as I have seen of the world, nothing is more ruinous than that unsettled state of mind, which would lead you, when you are fairly embarked in one profession, to grow dissatis-fied with it, and desert it for another. There are, I know, some remarkable instances in which the result was different; but it would be dangerous to quote these as precedents which you might safely follow, or to make the example of a peculiar genius, like that of Erskine, the foundation of a rule for ordinary men.

I know of no profession that is worthy of being

pursued, which does not require as much exertion,
as much labour, as many sacrifices, as that in which
you are engaged ; and I also know of none in which
he who has the necessary qualifications is more sure
of being rewarded for his labours. If it be your
ambition to obtain political rank, or to have that
sort of reputation which a political life affords, you
will be disappointed ; for, as I have already ob-
served, our profession has nothing to do with
politics. It belongs to private life, and the only
other association which it has, is that of science.
There are few departments of either physical or
moral science with which it is not, in a greater or
less degree, connected ; and there are some with
which the connection is so intimate, that the study
of them may be almost regarded as identical. The
study of anatomy and physiology is a necessary
preliminary to that of pathology ; and the former
cannot be understood by any one who has not
some knowledge of the laws of mechanics and
optics. Animal chemistry is daily becoming more
essential to physiology, and is even beginning to
illuminate some of the more obscure parts of the
science of disease. You are to look, not to political
rank, but to the rank of science. No other rank
belonged to Newton or Cavendish, to Hunter or
Davy ; yet their names will live in distant ages ;
and they will be regarded as benefactors of the
human race, when the greater number of their more
noisy cotemporaries, if remembered at all, are re-
membered without respect.

We are informed by his son-in-law and biogra-
pher, that, when Mr. Pott was seized with his last

illness, he said, " My lamp is nearly extinguished:
" I hope that it has burned for the benefit of
" others."   He addressed himself to his own
family, and died on the following day; and under
such circumstances it would be absurd to suppose
that this was said merely with a view to produce
an effect, or that these were any but his real and
heartfelt sentiments.   Undoubtedly it must be a
great satisfaction at the close of life, to be able to
look back on the years which are passed, and to
feel that you have lived, not for yourselves alone,
but that you have been useful to others. You may
be assured also, that the same feeling is a source
of comfort and happiness at any period of life.
There is nothing in this world so good as useful-
ness.   It binds your fellow-creatures to you, and
you to them ; it tends to the improvement of your
own character; and it gives you a real importance
in society much beyond what any artificial station
can bestow.   It is a great advantage to you, that
the profession in which you are about to enter, if
properly pursued, is pre-eminently useful.   It has
no other object ; and you cannot do good to your-
selves, without having done good to others first.
Thus it engenders good feelings and habits ; and I
know of no order in society, who, taken as a whole,
are more disinterested, or more ready to perform
acts of kindness to others, than the members of
the medical profession.

Usefulness is the best foundation of indepen-
dence.   There are some ways of life in which it is
common for individuals to obtain unmerited ad-
vancement by the patronage of others.   But you

must be your own patrons. Your knowledge, your skill, your good character, will constitute your fortunes. Your dearest friends will feel that they are not justified in entrusting the lives and comfort of themselves and their families to your care, unless they have reason to believe that it is safe and prudent for them to do so, and that they can do nothing better; and so far, you are no more under an obligation to those who consult you than a landlord is under an obligation to the tenant of his house or land. Those who are well-disposed towards you cannot help you, unless you first help yourselves. But let me not be mistaken. It is well to be conscious that you are to rely on your-selves alone; and that even if you were base enough to cringe and stoop for the purpose of obtaining the favour of others, you could derive no permanent advantage from it. This is the inde-pendence which I mean; and not that proud and misanthropical independence which rejects the feel-ing of all obligations to others. Whoever gives you his good opinion, whatever his station in life may be, is, in some measure, to be considered as conferring an obligation on you, and deserves to be regarded by you with kindness in return. Man-kind are bound to each other by mutually receiving and conferring benefits. You cannot live in the world, and, at the same time, live apart from it, and say, " I will owe no thanks to others ; for whatever advantages I may obtain I will be indebted to myself alone." All those, who do justice to your real or supposed merits, have a claim on your gratitude. As others will lean upon you, so you

must be content to lean upon them.   On no other
terms can you form a part of the great community
of mankind.

There are some employments which bring those
who are engaged in them in contact more espe-
cially with the bad qualities of mankind, their
pride, their arrogance, their selfishness, their want
of principle.   It is not so with your profession.
All varieties of character will be thrown open to
your view ; but, nevertheless, you will see on the
whole the better side of human nature ; much
indeed of its weakness, much of its failings, much
of what is wrong, but more of what is good, in it.
Communicating, as you will probably do, with
persons of all conditions, you will be led to esti-
mate others according to their intrinsic qualities,
and not according to those circumstances which are
external to themselves.   You will learn, that of the
various classes of which society is composed, no
one is pre-eminently good or pre-eminently bad ;
and that the difference is merely this, that the vices
and virtues of one class are not exactly the vices
and virtues of another.   You will have little sym-
pathy with those prejudices which separate differ-
ent classes from each other ; which cause the poor
to look with suspicion on the rich, and the rich to
look down upon the poor ; and while you cannot
fail to perceive the great advantages which educa-
tion gives, you will acknowledge, that, to be well
educated, is not the necessary result of having the
opportunity of education ; that a bad education is
worse than none at all ; and that what are called
the uneducated classes present many examples,

not only of the highest religious and moral prin-
ciples, but of superior intellect, and of minds stored
with valuable knowledge.

All this is good for your own minds ; but it is a
still greater advantage to you, that a good moral
character is not less necessary to your advance-
ment in the medical profession than skill and
knowledge. Nor is it merely a strict observance
of the higher rules of morality that is required.
You must feel and act as gentlemen. I can find
no word so expressive of what I mean as this. But
let there be no misunderstanding as to who is to
be regarded as a gentleman. It is not he who is
fashionable in his dress, expensive in his habits,
fond of fine equipages, pushing himself into the
society of those who are his superiors in their
worldly station, that is entitled to that appellation.
It is he who sympathizes with others, and is care-
ful not to hurt their feelings even on trifling occa-
sions ; who, in small things as well as in great,
observes that simple but comprehensive maxim of
our Christian faith, " Do unto others as you would
they should do unto you ;" who, in his intercourse
with society, assumes nothing which does not
belong to him, and yet respects himself; this is
the kind of gentleman which a medical practitioner
should wish to be. Never pretend to know that
which cannot be known ; make no promises which
it is not probable that you will be able to fulfil :
you will not satisfy every one at the moment, for
many require of our art what our art cannot bestow ;
but you may look forward with confidence to the
good opinion of the public, which time will bring,

as your reward, and to act otherwise is to put yourselves on a level with charlatans and quacks.

To obtain such a competency as will place your-selves and your families above the reach of want, and enable you to enjoy such of the comforts and advantages of life as usually fall to the lot of persons in the same station with yourselves, is, undoubtedly, one of your first duties, and one of the principal objects to which your attention should be directed ; but, nevertheless, let it never be for-gotten that this forms but a part, and a small part, of professional success.   If, indeed, money were the only object of life ; if to enjoy the respect of others, and the approbation of your own consci-ence ; to feel that you are doing some good in the world, and that your names will be held in esteem when you are gone out of it ; if these things were to form no part of your ambition, then, indeed, you might possibly have your ambition gratified by pursuing a different course from that which I have pointed out.   You might be unscrupulous in your promises ; undertaking to heal the incurable ; making much of trifling complaints for your own profit ; claiming credit where none belongs to you ; and you might try to advance yourselves by what is often called a knowledge of mankind, or a know-ledge of human nature.   But how is that term misapplied !   Knowledge of human nature indeed ! This is the most difficult, the most interesting, the most useful science in which the mind of man can be engaged.   Shakspeare knew human nature, as it were, by instinct.   It has been the favourite study of the greatest men, of Bacon, of Addison,

of Johnson.   But of those who are commonly
spoken of in the world as knowing human nature,
the majority are merely cunning men, who have a
keen perception of the weak points of other men's
characters, and thus know how to turn the failings
of those, who probably are superior to themselves
in intellect, to their own account.

Generous feelings belong to youth; and I cannot
suppose that there is a single individual present,
who would not turn away with disgust from any
advantages which were to be obtained by such
means as these.   Your future experience of the
world, if you use it properly, will but confirm you
in these sentiments; for you will discover that of
those who strive to elevate themselves by unworthy
artifices, it is only a very small proportion who
obtain even that to which they are contented to
aspire; and that the great majority are altogether
disappointed, living to be the contempt of others,
and especially so of their own profession, and, for
the most part, ending their days in wretchedness
and poverty.

There is only one other subject to which, in con-
cluding this address, I think it right to claim your
attention.   You have duties to perform among
yourselves, one to another. There is no one among
us who does not exercise an influence, to a greater
or less extent, over those with whom he associates,
while he is influenced by them in return.   In what-
ever orbit a man moves, he carries others with him.
If the vicious have their followers, those who set a
bright example of honour and integrity have their
followers also.   In like manner, industry in one

leads to industry in another, and the mind which is imbued with the love of knowledge cannot fail to communicate some portion of that holy inspiration to the minds of others. These, which are among the higher responsibilities of life, have begun with you already. The course which you individually may pursue, does not concern yourselves alone. While you are making your own characters, you will help to make the characters of others. Let this consideration be ever present to your thoughts. It will give you an increased interest in life. It will extend your sympathies with those around you ; and it will afford you an additional stimulus to persevere in those honourable exertions, for which you will, at no great distance of time, be rewarded by the respect of the world, and the esteem of your own profession.

LECTURE III.

ON THE EFFECTS OF STRANGULATION.*

THE subject which I have chosen for the present lecture is of much interest, inasmuch as it involves the consideration of some important questions in physiology. It also possesses a strong claim on your attention as practitioners. If you are called to a person who is in danger of perishing from strangulation, you have no time to go home and consult your books, or ask the opinion of your friends ; the case is pressing ; if any thing can be done it must be done at once, and it is not sufficient for you to know the treatment which *may be* useful, you must also know where it is worth while to have recourse to it, and to distinguish from each other those cases in which some grounds of hope exist, and those which are actually hopeless. Nor is this all ; on these occasions you are liable to be called upon to give evidence in a court of

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* This and the following lecture formed part of a course delivered in the Theatre of the Royal College of Surgeons of London as long ago as the year 1821. The lectures themselves are now published for the first time. Much of what they contain, however, may be found in the useful and comprehensive work on Medical Jurisprudence by Dr. Paris and Mr. Fonblanque, taken from the notes which I communicated to Dr. Paris.

justice, and you will cut but a sorry figure before a judge and jury, unless you have an adequate knowledge, not only of the surgical treatment, but also of the physiology, of strangulation.

It is evident that the effects of strangulation produced by a cord drawn tight round the neck must be more or less complicated :—1. It has been said that one of these effects is an injury of the cervical portion of the spine, and that there may be even dislocation of the odontoid process of the second vertebra ; 2. There is always pressure on the blood-vessels ; 3. There cannot be pressure on the vessels without pressure on the nerves also ; and, 4. There is pressure on, and obstruction of, the trachea.

Which of these is the cause of death ?

1. With respect to the one first mentioned, I may observe, that I have examined the bodies of several persons who had been hanged, and never found the spine to have been injured in a single instance. It is certainly a rare occurrence. Louis, however, mentions that he had examined the necks of criminals who had been hanged by two different executioners, and that he ascertained that in those who had been executed by one of them there was a luxation of the first vertebra from the second, while it was not so in those who had been executed by the other.

2. I have seen the inner tunick of the carotid arteries lacerated by the pressure of the cord. This appearance, however, does not (as I believe) present itself in the majority of cases. It is manifest, that the pressure must always operate

on the jugular veins so as to interfere with the due
return of blood to the heart, and cause an accu-
mulation of it in the vessels of the brain.   In
examining the body of one person who had been
hanged, I found a large extravasation of blood in
the substance of the cerebrum ; and in Dr. Hooper's
valuable museum of pathological anatomy there is
the brain of another person who had died in the
same manner, with a considerable extravasation of
blood among the membranes.   These are, how-
ever, undoubtedly, exceptions to the general rule.
Neither vascular congestion, nor sanguineous apo-
plexy, is the common cause of death from strangu-
lation.   I passed a ligature under the trachea of
a guinea pig ; and having drawn it as tight as
possible, I secured it with a knot at the back
of the neck ; so that it included all the parts
situated in the neck, with the exception of the
trachea.   The animal seemed uneasy, but breathed
and moved about, and continued to do so after the
ligature was removed at the end of a quarter of an
hour from the period of its application.

If the ligature were to make such pressure on
the arteries which supply the brain as to prevent
altogether the influx of blood into it, it is to be
presumed that immediate death would be the con-
sequence ; but the fact is that the vertebral arteries
are out of the reach of pressure, and maintain the
circulation notwithstanding the obstruction of the
carotid.*

* The remark is sufficiently obvious ; but it may be worth
while to notice the confirmation of it by an interesting experi-
ment of Sir Astley Cooper.   Sir Astley found that the vertebral

3. It is not to be supposed that the pressure of the cord on the nerves of the neck can be the immediate cause of death, as the most important of these nerves (the pneumogastric) may be completely divided, and yet the animal may survive the injury for a considerable time. It is not, however, very improbable, that if an individual were to recover from the first effects of strangulation, he might suffer from the injury done to the nerves afterwards. The animal which was the subject of the experiment which has been just related died on the following day. On dissection, I could discover nothing unusual in the brain; but the lungs were dark-coloured, and turgid with blood, presenting an appearance a good deal similar to what I have observed in animals who have died after the division of the pneumogastric nerves. That a temporary pressure on a nerve should leave the functions of the nerve impaired for a certain period is no more than what happens in many other cases; for example:—A gentleman met with an accident which caused a dislocation of the shoulder. The dislocation, as I was informed, was not easily reduced, the patient being for a considerable time under the operation. The extending force had been applied above the elbow, and when I saw the patient, two or three days

and carotid arteries of a rabbit, near their origin, are so situated that it is easy to make pressure on them at the same time. The result of such pressure is, that the animal appears to die instantaneously. But the heart continues to act, and by immediately having recourse to artificial respiration he is restored to life, as after strangulation.

afterwards, the forearm and hand were benumbed, and the muscles were paralytic, and several weeks elapsed before these symptoms were completely removed.

4. There can be no doubt that strangulation causes death by closing the trachea, and preventing respiration; and that whatever other effects it produces are of secondary importance to this.

Dr. Munro hanged a dog, having previously made an opening in the trachea below the part at which the ligature was applied; the animal was kept in this state for an hour, and lived afterwards.

If an animal be hanged, and, as soon as he becomes insensible, an opening be made in the trachea below the ligature, he begins to breathe, and his sensibility is restored.

A ligature which includes the trachea, and nothing else, produces death exactly in the same manner as if the entire neck had been included in it.

It is needless to adduce further evidence on the subject. The mode of death from strangulation or hanging is sufficiently obvious. 1. The treachea is obstructed, so that air cannot enter the lungs. 2. The blood passing through the lungs does not undergo that change which respiration produces, and which is necessary to life. 3. Dark-coloured blood, which has not been purified by exposure to air, is transmitted to the left side of the heart, and from thence to the brain and other organs. 4. The heart continues to act, circulating dark-coloured blood, but its actions gradually become

weaker, and, in the course of a very few minutes, cease altogether.*

But here the question arises, what is the immediate cause of the cessation of the heart's action? The circulation of the blood continues only for a certain period after respiration has become suspended; why is that period limited?

Some explanations of this fact have been offered formerly, which will not be accepted in the present more advanced state of physiological science. Especially, it has been said that the motions of the lungs connected with the alternate admission and expulsion of air were somehow necessary to the motion of the heart. Now, it is quite true that whatever, by enlarging the dimensions of the chest, tends to draw air into the lungs, must also tend to draw blood into the heart, and so far it may be supposed that the action of the diaphragm and intercostal muscles may contribute in a small degree to the maintenance of the circulation. The temporary relief which a deep sigh affords under certain circumstances may probably be thus explained. However that may be, an experiment made long ago by Dr. Hook is sufficient to estab-

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* It appears that in some instances of those who are hanged *as criminals* other injuries are inflicted besides those which have been enumerated. Dr. Hunter, in two individuals whom he examined, found extensive contusions and lacerations of the muscles, and the arytenoid and thyroid cartilages separated from each other. (*See Pathological Observations by Dr. Hunter, in the Dublin Hospital Reports.*) These complications may be attributed to the greater violence exercised in this mode of hanging, compared with that in persons who have attempted suicide.

lish the fact, that the powerful muscle of the heart does not in reality require any such external aid for the due performance of its ordinary functions. This distinguished philosopher having laid open the thorax of a dog so as to expose the heart and lungs, and having applied the nozzle of a pair of double bellows to the trachea, made a great number of punctures in the pleura on the surface of the lungs. The air-cells being thus exposed, by means of the double bellows, he maintained a constant stream of air through the lungs, that which entered by the trachea finding its way out by the superficial air-cells. Thus, respiration was kept up while the lungs were perfectly quiescent. The result was, that the heart continued to act vigorously as long as the current of air through the lungs was uninterrupted. When the use of the bellows was suspended, its actions became more feeble ; when it was resumed, they regained their strength.

Another hypothesis has been, that the heart is made to contract by the blood in its cavities acting as a stimulus to its muscular fibres ; but that this property is confined to the scarlet blood, which has just received the vivifying influence of oxygen, and of which there is, of course, no supply after the obstruction of respiration. But the right ventricle, which, under no circumstances, contains anything but dark-coloured venous blood, contracts, as well as the left. If it be said that the two ventricles are intimately connected with each other, that they contract simultaneously, and that the scarlet blood in the left ventricle acts as a stimulus

to the muscular fibres of the right ventricle also, it may be answered, that it is quite true that in the human subject the connection of the two ventricles is intimate enough, but that it is not so in all animals. In the dugong, for example, they are quite separate and distinct; and in the whole race of fish there is only a single heart, which, receiving the blood from the general system, and transmitting it to the organs of respiration, of course contains only that which is dark-coloured.

Under the influence of higher views in physiology, Bichat has furnished us with another solution of the connection which exists between the functions of the lungs and those of the heart. The florid scarlet blood is necessary to the generation of muscular irritability. In a suffocated animal the dark-coloured blood penetrates the muscular structure of the heart by the coronary, as it does the rest of the system by the other arteries; and the irritability of the heart, when it is once exhausted, is not renewed in the usual manner. But there is more than this. In the free discussion of received opinions, without which no advances can be made in science, we are led to inquire whether the doctrine of Haller, that the contractions of the heart are produced by the contact of the blood in its cavities, be really well founded? It seems to me that there is abundant evidence to the contrary. Let an opening be made into one or all of the great vessels near the heart;—the veins that take the blood in, or the arteries that carry it out;—the cavities are then almost instantaneously emptied of blood; but the contractions of the heart continue

nevertheless; at first regular, frequent, and vigo-
rous, then gradually becoming less so, until they
cease altogether; and the motions of the heart,
under these circumstances, without any blood in it,
last as nearly as can be for the same time as those
of the heart distended with blood after strangula-
tion.   But if the blood be not the stimulus, to what
can we attribute the contractions of the heart, unless
it be the influence of the nervous system?   And is
not this a much more reasonable hypothesis than
the other, more conformable to analogy, and offer-
ing a better explanation of the phenomena which
occur both in health and in disease?   The supply
of scarlet blood is not less necessary to the produc-
tion of nervous energy than it is to that of muscular
irritability.   The diaphragm is stimulated to con-
tract in respiration, not by the air in the lungs, but
by impressions which it receives through the
phrenic nerves.   So it is with the muscles which
are concerned in the acts of coughing, sneezing,
vomiting.   In a case of extra-uterine conception,
the uterus begins to contract at the expiration of
the ordinary period of gestation, although there is
no fœtus to be expelled.   Taking this view of the
subject, we understand why the successive con-
tractions of the different portions of the heart are
as regular and as orderly as those of the muscles of
respiration, or of the muscles of the limbs in
walking.   We have an easy solution of the various
irregularities of the circulation produced by mental
emotions, and by other causes; and we also under-
stand why the suspension of respiration must soon
be followed by a suspension of the action of the

heart, and why the same thing would happen even if it were possible that the irritability of the muscular fibres should remain unimpaired. There is only one fact which in the first instance may seem to be opposed to this conclusion. The heart, completely separated from its connexions, and even removed from the body, will continue for a time to contract, and the contractions will be as orderly and as vigorous as if, after it was emptied of its blood, it had been allowed to remain in the thorax with its connexions undisturbed. Of this, however, an easy explanation may be offered, namely, that the nerves of the heart are something more than mere conductors of the nervous influence, and that they retain the power of stimulating the fibres to contract for a certain period after they have been detached from the nervous centres.*

* These views relating to the circulation are taken from the Croonian lecture which I communicated to the Royal Society in the year 1814. The lecture was directed by the Council to be inserted in the Philosophical Transactions; but the publication was deferred at my request, as I did not consider the investigation to be sufficiently matured to be laid before the public. Since the present volume was prepared for the press I have been made acquainted with Mr. Beck's researches respecting the nerves of the abdomen; the importance of which in reference to the subject treated of above is sufficiently obvious. In Mr. Beck's dissection it is clearly shown that the branches of the splanchnic nerves are respectively accompanied by processes or elongations of the grey material of the nervous system; and Mr. Beck has informed me that he has ascertained that the nerves of the cardiac plexus possess the same compound structure. This being the case there can be little doubt that the cardiac nerves possess the property which I have attributed to them of generating the nervous influence.

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Here another question arises, of no small practical importance :—For what length of time does the heart continue to act, so as to circulate the blood, after respiration has ceased ?

1st. This will depend on the age of the animal. The condition of the child before birth seems to bear a good deal of resemblance to that of a reptile ; and that of a newly-born infant partakes somewhat of the same character, so that the circulation will in him continue for a longer time after the suspension of breathing than in the adult. This fact is well known to practitioners in midwifery, and it explains the great success with which they have recourse to the artificial inflation of the lungs in still-born children.

2. Something will depend, also, on the quantity of air retained in the lungs. It is remarkable, that in hanged animals, under ordinary circumstances, there is always a forcible expulsion of air from the lungs, in consequence of which they are found to be almost empty after death. This fact is well established by the experiments of the late Mr.Coleman. In a dog, whose lungs, when fully distended, would contain forty-three drachms, he found, after strangulation, that not more than one drachm was contained in the air-cells and bronchi.

Under ordinary circumstances, according to my observations, it rarely happens that the heart continues to contract so as to maintain the circulation for more than four minutes after the trachea is completely obstructed. In weak and exhausted animals the period appears to be shorter than in those that are strong and vigorous.

If animals were hanged in the act of inspiration, having the lungs distended with air, we may presume that the period would be longer than what I have mentioned; and an experiment made by Mr. Coleman justifies this conclusion.

Mr. Kite connected a bladder filled with air with a tube, and the tube with the trachea of a dog. He then kept the lungs of the dog forcibly distended by pressure on the bladder. The animal showed no signs of uneasiness for eight minutes; then symptoms of suffocation began to show themselves; nevertheless, at the end of twelve minutes the heart was still acting.

It is of great consequence that we should bear in mind that the heart will maintain the circulation of the dark-coloured blood for only a very few minutes after the trachea is completely closed. I shall show you hereafter that where, under these circumstances, the circulation has once ceased it can never be restored.

I know that what I have just stated, as to the period of time during which the heart may continue to act after respiration has ceased, may appear to be in contradiction to what has been stated by some other physiologists. But observe, that I speak only of those orderly, regular, and vigorous contractions, by which, and by which only, the circulation of the blood can be maintained. There are other irregular and feebler contractions, which correspond to those of the *panniculus carnosus* in a newly-slaughtered bullock, which may continue for a much longer period, and which, when the heart has become quiescent within

the chest, may be reinduced on it being exposed to the air. But these are no more capable of carrying on the circulation of the blood, than the irregular contractions of the muscles of the limbs, produced by a voltaic battery, are of causing an animal to rise and walk. These two kinds of movements are easily to be distinguished from each other. Yet the distinction has often not been made, and the want of it has led to many errors, both of theory and of practice.

The first symptoms which are observed in a hanged animal are a dark colour of the lips and nose, and of other parts in which the hue of the blood can be observed, the result at once of venous congestion and of the want of oxygenation of the blood.

Then there are involuntary actions of the muscles, producing convulsions which are frightful to those who behold them, but of which there is no reason to believe that they are indicative of pain more than the convulsions of an epileptic fit. If at this period the eyes be touched, there is no motion of the eyelids; and those who have recovered from the effects of strangulation have no recollection of their having been in a state of suffering. The contact of the dark-coloured blood with the brain and spinal chord sufficiently explains the involuntary spasmodic actions of the muscles; and from all that we can learn on the subject, there is great reason to believe that the sensibility of those organs is destroyed at a very early period.

The diaphragm and intercostal muscles, however, continue to act for some time, or rather attempting to act; for as the trachea is obstructed they cannot act to any purpose, so as to enlarge the dimensions of the chest. The period during which these efforts to inspire continue is not the same in all cases. On an average it may be as much as one minute and a half or two minutes; when they cease the pulse of the heart and arteries is still distinctly to be felt, and the action of the heart continues of sufficient strength to maintain the circulation for two or three minutes longer.

If the ligature be removed from the neck before the contractions of the diaphragm have ceased, air is of course drawn into the lungs; the blood which is still circulating through them becomes decarbonized; scarlet blood passes into the left auricle and ventricle of the heart, and from thence is distributed to the muscular structure of the heart itself, to the brain and spinal chord, and other organs. Respiration continues, and the action of the heart is maintained in the usual manner.

Or, if the contractions of the diaphragm have ceased, and in the very short interval during which the heart continues to act afterwards the lungs be inflated, so as to produce artificial respiration, the usual change is produced in the quality of the blood; the circulation continues; in the course of a few minutes the animal makes a spontaneous effort to breathe; other efforts follow, and then, if the artificial respiration be dispensed with, he continues to breathe as under ordinary circumstances.

Still the consequences of the strangulation are
not at an end, nor is ultimate recovery a matter of
course because natural respiration is restored.

It would be tedious for me to relate to you all
the particular observations which I have made on
this interesting and important subject ; and it will
be sufficient to make you acquainted with their
general results.

The effects produced by the circulation of dark-
coloured blood are not merely negative. It
operates like a narcotic poison, and even after
natural respiration is restored the animal remains
as insensible to external impressions, and as inca-
pable of voluntary movements as if he were under
the influence of opium, or the woorara. While in
this state he is not unfrequently affected with con-
vulsive actions of the voluntary muscles ; and even
when he first begins to recover there is occasionally,
in quadrupeds, a more or less complete paralysis of
the muscles of the hind limbs. The state of coma
may continue for a few minutes, or for an hour, or
even for several hours, the period probably varying
according to the length of time during which the
dark-coloured blood was circulating. If in one case
the cord be removed before the natural efforts to
respire have ceased, and in another only just in
time to maintain the heart's action by artificial
respiration, the period of recovery will be very
short in the first case, and probably very long in
the second. In some instances, after remaining for
a considerable time in a state of coma, respiration
is again suspended ; so that if recovery had been
effected in the first instance by means of artificial

respiration, the animal may be said to die a second time. In others, although sensibility is restored, and with it the power of locomotion, it is only for a time; another attack of coma follows, and this is fatal.

These statements are founded chiefly on experiments made on the lower animals, but there is no essential difference between the phenomena which occur in them and in the human subject. The case which I am about to mention justifies this observation. It was communicated to me by Mr. Rose, under whose care the patient was placed. A boy, of the name of William Claridge, seventeen years of age, attempted to hang himself in the evening of the 17th of July 1820. He was discovered after a short period of suspension (the exact length of the period being unknown), and immediately cut down. He was at this time completely insensible; his face was livid, his lips were of a dark purple colour, the pupils of his eyes were dilated and motionless, his pulse not perceptible at the wrist. A pair of bellows being at hand, artificial respiration was immediately had recourse to. In about a quarter of an hour the diaphragm began to act. The artificial respiration was now discontinued. He breathed at irregular intervals, with stertor, and a rattling noise, from the air passages being choked with mucus. The pulse was now perceptible, but often flagging, and the surface of the body was disposed to be cold. The countenance was still of a livid hue, but the breathing became more frequent and regular, and there was also an improvement in the pulse. At the end of another hour an attempt was made to

take some blood from the arm, but it was not successful; and from the coldness of the surface of the body it was thought expedient to place him in a warm bath. During the night he continued to breathe, the stertorous breathing continued. In the morning a vein was again opened in the arm, and twelve ounces of blood were taken away, but no relief followed. He continued insensible, cold on the surface, and frothing at the mouth, and died at the end of twenty-four hours from the time of his having been cut down.

The body was carefully examined. The vessels of the brain seemed to be turgid with dark-coloured blood, but there were no other morbid appearances.

Dr. Latham has given me some particulars of another case a good deal similar to the last, but having a more fortunate result. A labouring man, with a family, had been drinking day after day until all his money was exhausted. After a night's sleep he awoke sober, but to a sense of such desperate remorse that he went into a cellar and hanged himself. How long he had been hanging nobody knew; but when he was cut down he was supposed to be dead. He was, however, only insensible, and in that state he was taken to the Middlesex Hospital, where he lay for a considerable time insensible, and breathing with an apoplectic stertor, but eventually recovered.*

* After his recovery a phenomenon was observed similar to what occurs after injuries of the brain; he had no recollection whatever of his attempted suicide.

Treatment to be had recourse to in Cases of
Strangulation.

Death from strangulation takes place at so early
a period, that, in the case of a human being at
least, it only occasionally happens that the inter-
ference of art can be of any service. At all events
it can be only by a sort of accident that you will
see the patient in the first instance. But such an
accident may occur, and you should know how to
meet it.

Let us suppose, then, that the cord is removed
from the neck before the efforts of the diaphragm
to draw in air have ceased : all that you have to
do is to watch the patient carefully ; if natural
respiration continues, to leave him to himself; if
it ceases, to supply the want of it by inflating the
lungs artificially.

If, on the other hand, the efforts of the diaphragm
have already ceased, you must have recourse to arti-
ficial respiration without delay. The interval which
elapses between the suspension of the efforts of the
diaphragm and that of the action of the heart,
being never more than two or three minutes, you
have no time to lose, no leisure for inquiries. If
the pulse can be felt, either of the heart or of the
arteries, you will know that your patient may
probably be saved. But the pulse may be imper-
ceptible, and yet some feeble action of the heart
may continue sufficient to maintain the circulation,
and you must give your patient the chance which
artificial respiration affords him, however small it
be. If the circulation be still going on, and the

process be properly conducted, a few minutes will
be sufficient to restore the pulse, and in a few
minutes more the diaphragm will begin to act
spontaneously, and then the artificial respiration
may be dispensed with.

But you cannot lose sight of your patient, never-
theless.   I have already explained that the circula-
tion of the dark-coloured blood through the brain
leaves behind it the effects which are produced by
a narcotic poison.   The patient may remain in a
state of coma, breathing laboriously and with
stertor.   By-and-by the breathing may cease
altogether, and here, then, is a second period, at
which artificial respiration may be necessary to
preserve his life ; and the fact is that it can scarcely
ever happen, even in the course of a long practice,
that you will have the opportunity of employing
artificial respiration during the first of these
periods, while you may every now and then find it
necessary to have recourse to it during the second.

The mode of conducting artificial respiration
claims our attention next ; and I am tempted to
extend my observations on it, because I find but
little information on the subject in books, and
because there are other occasions besides those of
persons labouring under the effects of strangulation,
in which it may be required.

In some animals, as in the rabbit, a considerable
quantity of air may be made to enter the lungs by
merely elevating the ribs. Something may be done
by the same process in the human subject, but
certainly not sufficient for the maintenance of life.
The only effectual method of supplying the want

of natural respiration is that of inflating the lungs by a pair of bellows, or a syringe, or some similar contrivance.

This may seem to be a very simple matter, but it is not quite so simple in reality. The air impelled into the lungs should be as much as is inhaled in ordinary respiration; but not more than this, for, independently of other objections, there would then be danger that the too forcible distension of the air-cells would cause a portion of the air to enter the blood-vessels, thus occasioning almost instantaneous death. Again the inflation of the lungs should be performed at proper intervals, so as to resemble natural respiration as nearly as possible. The operator should have a watch with a second hand before him: when the pulse can be felt it may be counted by an assistant, and the lungs may be inflated accordingly, it being borne in mind that, under ordinary circumstances, there are three inspirations for one pulsation of the heart and arteries.

Various contrivances have been proposed for the purpose of inflating the lungs; the single and double bellows, elastic gum bottles, and syringes of different kinds. It has been recommended, that the tube of inflation should be introduced into the trachea, through the aperture of the glottis, or through an opening made artificially, or that it should simply be passed into the nostril. Some have suggested that the air introduced into the lungs shall be exactly measured by means of a graduated syringe; others, that the air should be previously warmed; and others, again, that

oxygen gas should be employed instead of atmospheric air.

Before we consider the value of the several suggestions, I may observe, that in these cases, for the most part, you must be content to do the best in your power with the machinery which you have at hand. You may have a graduated syringe in your possession, or an apparatus for warming the air, or a gasometer full of oxygen gas, but you cannot carry them always with you ; your house may be a mile, or even ten miles off, and while you are sending for what you think you want, the precious moments are running away, and your patient is gone for ever.

And the fact is, that none of these things are necessary. There is no reason to believe that warm air is better than cold, perhaps it is not so good ; and there is great reason to believe that pure oxygen gas is not fitted for respiration, and, at any rate, that it is much inferior to that happy mixture which constitutes the air of the atmosphere.*

* This opinion is fully confirmed by some very interesting observations made by Mr. S. D. Broughton, F. R. S., and published in the twenty-eighth volume of the Quarterly Journal of Science, Literature, and Art. Animals confined in vessels filled with oxygen gas, after a certain time, fell into a state of stupor, as if under the influence of a narcotic poison, and died. The heart continued to act after respiration had ceased ; and if artificial respiration was had recourse to, and the lungs inflated with *common* air, the animal was restored to life. These effects were produced although the air was so little deteriorated that a second animal, introduced into it after the first animal had been poisoned, breathed for a time with perfect ease. In these experiments the blood in the veins had the same bright scarlet colour with that in the arteries.

A graduated syringe would tell you nothing, unless the tube of inflation were so closely fitted to the trachea that no air could escape by its side. The introduction of a tube into the trachea, in this class of cases, is not only not at all required, but it is much less convenient than the introduction of it into the nostril. The double bellows, which some have recommended formerly, is neither more nor less than a gross absurdity.

In the course of my physiological investigations I have had a large experience in the employment of artificial respiration in animals; and I have had some experience of it (though a small one as compared with that in animals) in the human subject; and I shall be able in a few words to inform you of the result of my observations on the subject.

Where the respiration is obstructed by inflammation and swelling of the mucous membrane of the pharynx and larynx, or by a tumour in this situation, the lungs can be inflated only by means of a tube introduced into the trachea. It sometimes may, and sometimes may not, be possible to introduce a curved silver tube into the *rima glottidis;* but it is a little difficult to do so under the most favourable circumstances, and I conclude that there is always danger that a foreign body in the glottis will excite irritation, as soon as the sensibility of the patient is restored. The simplest mode of proceeding is to make an opening with a double-edged scalpel in the space between the cricoid and thyroid cartilages, this situation being more convenient (where time is valuable) than one lower down, on account of the smaller

quantity of dissection which is required for the
exposure of the trachea in the former case, and
the greater liability to hæmorrhage in the latter.

However, in the cases of strangulation which
are now under our consideration, where the cause
of the strangulation can be removed, it is not only
not necessary to introduce a tube into the trachea,
but it is a great deal better not to do so.   A tube
introduced into one nostril will answer every pur-
pose, and this method possesses one very great
advantage, that it is attended with no delay.
A short ivory tube, of the size of the anterior
aperture of the nostril, and with a projecting rim,
to prevent it slipping in beyond your reach, is
very convenient for the purpose ; but this may
not be at hand ; and you will find a large elastic
gum catheter ; a piece of card rolled into a cylinder ;
or the nozzle of a pair of bellows, to answer the
purpose well enough, and at all events any one
of these may be used until you are provided with
a better apparatus.

In smaller animals, there is no more convenient
machine for impelling air into the lungs than an
elastic gum bottle.   But the gum bottles commonly
in use are not sufficiently capacious to be used in
the human subject, and nothing can be more con-
venient than a pair of bellows.   Bellows made
expressly for the purpose should, when fully ex-
panded, contain from fifty to sixty cubic inches of
air, and should have a flexible tube adapted to the
short ivory tube which is fitted to the nostril.
But on most occasions you must make shift with
any bellows that you can obtain at the moment,

and must probably be content to insert the nozzle itself into the nostril. Even these may not be to be had at once, and you must then be content, in the first instance, to inflate the lungs by your own breath, or by that of another person, with the aid of a gum tube, or any other tube that can be procured.

During the process of inflating the lungs, the upper part of the patient's person should be exposed, and the operator will then know, by observing a gentle elevation of the chest and abdomen, that the lungs are sufficiently inflated. As I have already stated, the number of inflations in a minute should not exceed that of ordinary inspiration, and care should be taken not forcibly to distend the lungs, lest a portion of the air should be forced into the ramifications of the pulmonary vessels. But it is needless to give directions as to the exact admeasurement of the air. However good this may be in theory it is practically impossible. A portion of the air escapes by the other nostril and the mouth, and these apertures must not be closed, as they form a safety-valve, which will do more towards preventing the over-distension of the lungs than the most ingenious apparatus. Still something must be left to the prudence of the operator, especially if the bellows be of a large size; and he must bear in mind that the quantity of air which is required at each artificial inspiration is not only not greater, but that it may even be less than in natural breathing. There is only one further precaution necessary; an assistant should press the

thyroid and cricoid cartilages against the vertebræ
so as to close the upper extremity of the œsophagus,
otherwise a portion of air will at each closure of
the bellows find its way into the stomach, gradually
distending it until it prevents the descent of the
diaphragm and the entrance of the air into the
lungs altogether.

The only source of danger in the operation of
artificially inflating the lungs is that of the forcible
impulsion of air into the circulating blood through
the thin tunicks of the capillary vessels of the
lungs ; and by attending to the precautions which
have been just enumerated this accident is easily
avoided.   But the question will arise, May not
the same object be attained by other means ?
Undoubtedly the influence of voltaic electricity
properly applied will bring the diaphragm and
intercostal muscles into vigorous action, and may
be used in physiological experiments as a substitute
for the other method.   But it is quite inapplicable
in surgical practice.   A pair of bellows may be
obtained anywhere : but a voltaic battery, or any
other apparatus that may be substituted for it, is
not to be had at the moment, and even if it
were, some time will be required for bringing it
into operation, during which the heart will cease
to act.   But, further than this, even in physio-
logical researches the voltaic battery is much
less convenient than the bellows or the elastic
gum bottle.   To apply it properly an incision
must be made in the neck, and another in the
abdomen, for the purpose of applying the wire to
the diaphragm, and even then its effects will not be

confined to the diaphragm, but other muscles will be brought into action, the action of which is not only not required, but inconvenient or actually injurious.

It cannot be too strongly impressed on your minds that in these cases for the most part there is no time to be lost. If the natural efforts to respire have actually ceased, the cessation of the heart's action will take place in the course of a very few minutes. If the patient recover from the first effects of the strangulation, but lies with stertorous respiration, and other symptoms of apoplexy, he may cease to breathe altogether at any moment; *and if that action of the heart by which the circulation is maintained should cease, as a consequence of the suspension of respiration, it can never be restored. This I positively assert, after having made it the subject of a very careful investigation.* If others have held a different opinion, it is because they have confounded those feeble and irregular contractions of the heart, which may last for a long time, but which mean nothing, with those regular and powerful movements which are necessary to propel the blood through the system. The most probable means of restoring the action of the heart would seem to be the application of voltaic electricity. But Bichat distinctly states that it has no influence whatever over the involuntary muscles; and without venturing either absolutely to confirm, or absolutely to deny this assertion, I am bound to say, after having made many experiments on the subject, that when the mode of death is that to which the

name of asphyxia has been commonly but (according to its etymology) most absurdly and improperly applied, the application of electricity in any form to the heart is altogether useless. Nor is this conclusion at all different from that which *à priori* we might have expected. When the order of the phenomena in a dying animal is such as I have just described, there is nothing in the circulation of the dark-coloured blood which can renew the failing powers, either of the muscular fibres of the heart, or those of the nervous system. The case is entirely different from that of death from syncope, where the action of the heart ceases at the same time with that of the muscles of respiration, or probably sooner. Here the animal dies having the left auricle and ventricle distended with scarlet blood. The heart is quiescent; but neither has its irritability become exhausted, nor has the nervous system been narcotised, by the circulation of blood of a different quality. It is no matter of wonder that under these circumstances the heart should be able to resume its functions, and perform them with as much energy as before; and that it may do so, even when syncope has been produced by the introduction of the infusion of tobacco into the intestinal canal, is sufficiently proved by an experiment of which you will find an account in my first series of observations on the effects of poisons in the animal system.*

* Philosophical Transactions, 1811.

What remains to be said of the treatment after strangulation may be comprised in a few words.

It has been recommended that blood should be taken by venæsection, or in some other way. But in the case of the patient treated by Mr. Rose this was done without any apparent advantage. I am not aware that there is any actual experience in favour of this practice; still, as congestion of the vessels of the brain may be one of the effects of strangulation, I do not feel myself justified in saying that it is never proper. The practitioner must be directed by the circumstances of each individual case, forming his judgment especially from the state of the pulse, but bearing in mind that the circulation of dark-coloured blood, during however short a period of time, cannot have taken place without a diminution of the powers of life, and that if blood be taken at all it should be done prudently and cautiously.

Another remedy has been recommended in the shape of the warm bath; but I cannot doubt that whatever advantage it may afford, may be obtained by keeping the patient in an atmosphere of a moderately warm temperature. In fact, whenever the effects of strangulation are of long continuance, this is absolutely necessary to compensate for the insufficient generation of animal heat, which is the consequence of the impaired state of the functions of the brain, whether arising from the influence of a narcotic poison, or from another cause.

LECTURE IV.

ON THE MODE OF DEATH FROM DROWNING.

ANIMALS that are intended to respire the air which is dissolved in the water by means of gills are generally capable, within certain limits, of respiring the air of the atmosphere, and there are some fish in which life may be thus maintained for a considerable time after they have been removed from their natural element. Mr. Clift has furnished me with the following observations made by him on the Lamprey. Under certain circumstances he may be seen attached to a stone above the level of the water, closely adhering to it by means of the powerful muscles of the mouth, which produce a vacuum with all the force of a piston. He inhales the air through a tube, which may be regarded as having some analogy to the trachea, and which communicates with the cavities that contain the gills ; and the air received in this manner passes out through the seven orifices which are placed on each side of the thorax, ascending from thence in bubbles to the surface of the water. In this manner he may be observed to continue to breathe for many successive hours.

Dr. John Davy has informed me of some interesting observations, which he has made on another fish ; the Benito (the Scomber pelamis of Linnæus).

The Benito seems to breathe in the air with not much less facility than in the water, and even to seek opportunities of exercising the former method of respiration; as if he were striving to pass the barrier which separates him from that higher order of animals in which the more perfect oxygenation of the blood occasions the developement of a larger portion of nervous energy.

But the converse of the proposition which I have just stated does not, as far as I know, hold good in any one instance. Animals which are constructed to breathe the air of the atmosphere by means of lungs, or of organs analogous to lungs, (those few reptiles only being excepted which are provided with gills also,) can breathe the air of the atmosphere only; and from man, the head of the creation, down to the snail or caterpillar, we find that they all die, when retained for a limited space of time beneath the surface of water.

Although a diversity of opinions may have existed formerly as to the mode in which submersion in water produces death, there is no such diversity at the present time. Death from drowning is similar to death the consequence of strangulation; and the want of the due oxygenation or decarbonization of the blood is the sole cause of the animal's destruction.

If a small animal be immersed in water in a transparent glass vessel, the phenomena of drowning are readily observable. There is first a deep expiration, by which bubbles of air are expelled from the lungs. There is then an effort to inspire; but the effort is ineffectual, there being no air

which can be received into the lungs ; and a spasm
of the muscles seems to prevent the admission of
water in any considerable quantity into the trachea.
The attempts to breathe are repeated several
times ; and after each attempt a small quantity of
air is expelled from the mouth and nostrils, until
the air-cells of the lungs are almost completely
emptied. Then the animal becomes insensible,
and convulsive actions of the muscles mark the
instant when the brain begins to suffer from the
influx of the dark-coloured blood. After these
convulsions the animal is motionless, and gives no
signs of life ; but if the hand be applied to the
thorax the pulsation of the heart, gradually becom-
ing fainter and fainter, indicates that some remains
of vitality still linger in the system. Before the
circulation ceases altogether, the muscles of respira-
tion resume their action, and some ineffectual
efforts are again made to breathe. It is a remark-
able circumstance that the diaphragm continues to
exert itself nearly as long as the heart itself, so
that the interval between the cessation of the
attempts to breathe and the cessation of the
motions of the heart, short as it is in animals
that die of strangulation, is shorter still in those
that perish from drowning. These phenomena
follow each other in rapid succession, and the
whole scene is closed, and the living animal is
converted into a lifeless corpse, in the brief space
of a few minutes. I have never opened the thorax
of an animal in which the heart was found acting
in such a manner as to maintain the circulation of
the blood so long as five minutes after complete
submersion ; and from the information which I

have received from some of the medical attendants at the receiving houses of the Royal Humane Society, I am led to believe that the period is very rarely, if ever, longer than this in the human subject.

I have remarked that a spasm of the muscles of the glottis seems to prevent the admission of water into the windpipe. Experiments have been made of drowning animals in various coloured liquids in which the coloured substance has been scarcely perceptible in the lungs on dissection. In a large cat which was drowned, I found less than a drachm of water in the ramifications of the bronchi. Dr. Goodwyn drowned a cat in quicksilver, and found not more than half an ounce even of this ponderous liquid in the lungs. It does not appear, however, that the admission of water into the lungs tends to hasten death, or that the spasm of the muscles of the glottis has any effect in preventing dissolution. I drowned a guinea-pig, in which I had previously made an opening in the trachea, so that the spasm of the glottis could have no effect in preventing the water from entering the lungs; but this made no difference in the symptoms which were produced, and did not prevent the restoration of the animal to life by proper methods. Dr. Goodwyn injected two ounces of water into the trachea of a dog, which at first occasioned some difficulty of breathing. This difficulty soon subsided; nevertheless, when the animal was killed some hours afterwards, the remains of the water were still found in the bronchial tubes. If water were injected into the lungs in sufficient quantity to prevent the

admission of air, of course it must occasion suffo-
cation; but there is no manifest reason why the
admission of a small quantity of water should be
very injurious.

That the admission of water into the lungs is
prevented by a spasm of the muscles of the glottis
cannot, however, be doubted, since we are unable
to account for the exclusion of it in any other
manner; and a multitude of circumstances prove
that these muscles form a sphincter to the windpipe,
as perfect in its functions as any sphincter in the
body.

I have said that in a drowned animal there is
always a deep expiration by which the air is
almost completely expelled from the lungs.
Mr. Coleman examined the lungs of a cat which
had been drowned, by placing a ligature on the
trachea, removing the lungs from the thorax, and
then making an artificial opening below the liga-
ture, all this being done under water. The air
which escaped when the opening was made
amounted only to half a drachm, yet the same lungs,
when inflated, required two ounces of air for their
complete distension. Were it possible for a man,
having made a deep inspiration previously to his
immersion in water, by means of a powerful effort,
to restrain the action of the abdominal muscles,
on which the forcible expulsion of air depends, we
must conclude that life would be less speedily
extinguished. I may here refer you to some ob-
servations on this subject which I made in my
lecture on the effects of strangulation, and which
it is unnecessary for me to repeat.

The question has been much agitated, For how long a period may an animal remain under water, without having the opportunity of rising to the surface, and yet be taken out alive, or in such a state as to admit of recovery? The fact is, that there is here no exception to the ordinary rule as to suffocation. A young animal may not die so soon as an old one. A strong and healthy animal may survive during a longer period than one that is in a state of exhaustion or debility. But in all cases, as I have already stated, the circulation ceases within four or five minutes from the moment of the last inspiration*, and there is reason to believe that the period, in many instances, is even shorter than this. In my experiments I have found the action of the heart to be generally more feeble in animals which are drowned than in those which are strangled; and I know not to what this difference can be attributed, unless it be the additional shock which the former species of death occasions to the nervous system, in consequence of the immersion of the animal in a cold medium which rapidly carries off the animal heat.

But it may be inquired, How are these observations to be reconciled with the ordinary histories

* Mr. Woolley, the intelligent and zealous surgical attendant at the Receiving House of the Royal Humane Society in Hyde Park, believes that very few lives are preserved after four minutes of complete submersion. In the year 1840, however, he met with a case in which a person recovered, although there was reason to believe that he had been five minutes under water; and a similar instance has since come under his observation. See a very interesting report by this gentleman in the account of the proceedings of the Humane Society for 1840.

of divers, who have become so expert in the art
which they profess as to be capable of remaining
under water for twenty minutes, or even for a
longer period? For these tales, which have been
imported from foreign and distant lands, a parallel
may be found in our own country; and the cases
which have been reported to the Royal Humane
Society of drowned persons who have been restored
to life, when taken up cold and breathless after an
immersion of half an hour, show that it is not
travellers alone that are guilty of the vices of
exaggeration and invention. We are compelled to
regard these as mere extravagant fables, not more
authentic, though certainly less poetical and
elegant, than those of nymphs and mermaids, who
reside in grottoes beneath the waves of the sea, or
than those Arabian fictions, which have astonished
our youthful imaginations with the history of
submarine nations, whose princes dwell in palaces
of crystal at the bottom of the ocean.

With respect to the time during which divers
can continue under water, I may refer you to the
account given by the Reverend Mr. Cordiner, in
his description of Ceylon. This gentleman, who
resided for several years at Columbo, in the
situation of chaplain to the garrison, was present
at the pearl fishery, and it will be seen how far
his authentic statement differs from the vulgar
reports which have been circulated on the subject.
" The diving stone," he says, " of the weight of
" fifty-six pounds, hangs from an oar by the side
" of the boat, and connected with the upper part
" of this stone is a rope, making a strong loop for

" receiving the foot of the diver. The diver, having
" only a thin slip of calico about his loins, puts
" his foot into this loop or stirrup at the top
" of the stone, and holds with his hands the rope
" by which the stone is connected to the oar.
" He remains in this position for some time, sup-
" porting himself by the motion of one arm ; then
" a basket, formed of a wooden hoop and network,
" suspended by a rope, is thrown into the water,
" and in it he places his other foot. When he
" feels himself properly prepared and ready to go
" down, he grasps his nostrils with one hand, to
" prevent the water from rushing in, and instantly
" descends. As soon as he touches the bottom he
" disengages his foot from the stone, which is
" immediately drawn up, and suspended again to
" the projecting oar to be in readiness for the
" next diver. The diver at the bottom of the sea
" throws himself as much as possible on his face,
" and collects every thing that he can get hold
" of into the basket, and the man who holds the
" other end of the rope hauls it up as speedily as
" possible : the diver at the same time, being free
" from every incumbrance, warps up by another
" rope, and always gets above the water a con-
" siderable time before the basket." Mr. Cordiner
then remarks, that he " observed with attention
" the time during which many of the divers
" remained under water, at the depth of seven
" fathoms. Some of them performed the dip
" within the space of one minute ; others came
" up in one minute and twenty seconds. Some
" persons who have frequently attended the fish-

" cries, and accompanied the divers to the banks,
" consider one minute and a half to be the longest
" period during which any diver remains under
" water. Other gentlemen, who are willing to allow
" the greatest latitude, say that they certainly
" never knew a diver to exceed two minutes."

It is probable that this last is above the proper
estimate ; and Dr. Davy who resided for a con-
siderable time in Ceylon, who did not, indeed,
witness the pearl-fishery himself, but had ample
opportunities of procuring authentic information
from others, assures me that the average time of
diving is less than a minute. We cannot suppose
it to be even so long as this, unless we also sup-
pose that the diver descends immediately after a
deep inspiration, so that he carries down a certain
quantity of air with him.

With respect to the fables of drowned persons
reported to have been restored to life after sub-
mersion for so long a period, it may be just to
remark, that although most of them may have
originated in a disposition to exaggerate, and to
convert events which are interesting into events
which are marvellous, it is probable that some of
them may be attributed to unintentional error.
A man in the act of drowning may rise more than
once to the surface of the water, each time inhaling
a supply of air by which his destruction may be
retarded. I suppose, moreover, that it is not
probable that a person on the bank of a river
would observe another, who is drowning, with a
watch in his hand, so as to reckon the exact
number of minutes which elapse before this terrible

scene is closed. We all know that our estimate
of time depends on the number of circumstances
which successively attract our notice. When an
event occurs which powerfully impresses the mind,
we watch every one of the minutest changes that
take place, and the time which elapses before the
whole event is completed appears to be propor-
tionally prolonged. Thus we hear of earthquakes in
which the commotion of the earth is said to have
continued during the space of eight or ten minutes,
although in all probability they lasted for no longer
time than thirty seconds; and in the same manner
we may account for the mistakes to which I have
just alluded. When the infidel sultan of Egypt
refused to believe that Mohammed could have
ascended into the seven heavens, and held one
thousand and one conferences with the Deity in
the brief space of a few minutes, the Mussul-
man divine, who was consulted on the occasion,
endeavoured to bring his majesty to a more strict
faith, by demonstrating that a short space of time
was converted into a long one when a great num-
ber of important events were crowded into it.

The observations which I have made respecting
the time in which animals are irrecoverably de-
stroyed by drowning relate to those which are
warm-blooded, and live on the surface of the earth.
But there is an extensive tribe of warm-blooded
animals, which, although they respire the air of
the atmosphere, yet live wholly in the water, or
else pass the greater portion of their lives in it;
and as these have frequent occasions to dive in
search of their prey, it is probable that they may

have the power of remaining under water for a
longer period than animals which are placed under
different circumstances.   There is reason to believe
that this observation is applicable even to aquatic
birds.   Mr. Robert Boyle, in the fifth volume of
the Philosophical Transactions, gives an account
of some experiments made by himself, in which he
found that the smaller birds were completely dead
after submersion for a single minute, whereas a
duck showed no signs of uneasiness for two
minutes; then began to struggle, and continued
to do so, and to emit bubbles of air from the
mouth for four minutes, so that four minutes had
elapsed before death had *apparently* taken place.
With respect to cetaceous animals, it is difficult to
procure any exact information as to the time
during which they can remain in the water with-
out coming to the surface to breathe; but we may
reasonably conclude, that an animal which re-
sembles fish so much in its form and mode of life,
would be endowed with the faculty of diving in
greater perfection than ordinary mammalia.   There
is a peculiar structure of the vascular system of
these animals, which has been described by John
Hunter, which has been overlooked by some of
the most eminent comparative anatomists of a
later period, and has not generally attracted so
much attention as it seems to me to merit.
John Hunter, in his observations on the structure
and economy of whales, remarks, that " the inter-
" costal arteries divide into a vast number of
" branches, which run in a serpentine course
" between the pleuræ, ribs, and their muscles,

" making a thick substance, somewhat similar to
" that formed by the spermatic artery of the bull.
" These vessels, everywhere lining the sides of the
" thorax, are seen between the ribs, near their arti-
" culations, and also behind the ligamentous attach-
" ments of the ribs, anastomosing with each other.
" The *medulla spinalis* is surrounded by a network
" of arteries in the same manner, more especially
" where it comes out of the brain, where a thick
" substance is formed by their ramifications and
" convolutions, and these vessels most probably
" anastomose with those of the thorax. The
" subclavian artery in the piked whale, before it
" passes over the first rib, sends down into the
" chest arteries which assist the intercostals in
" forming a plexus on the inside of the ribs.
" There are similar plexuses formed in the neck
" of the whale by branches of the carotids."
Whoever will examine the preparation which I
now show you, exhibiting this remarkable struc-
ture, and which appears to have been taken from
a porpoise of no great size, will perceive that
Mr. Hunter's description scarcely gives an adequate
notion of the magnitude and extent of this mass of
convoluted arteries. We cannot but suppose, that
it must answer some important purpose connected
with the peculiar habits of the being to which it
belongs. It is evident that this enormous vascular
plexus forms a reservoir of blood, containing
many times the quantity that is expelled from the
heart at each contraction of the left ventricle;
and that it is a reservoir of scarlet arterial blood,
which has not yet been used for the purposes of

life, not having passed through the capillaries of
the general system since it was exposed to the
influence of the air in the lungs. When the
animal plunges beneath the waves, and respiration
is suspended, the scarlet blood in the plexuses
must gradually become mixed with the dark-
coloured blood that is returned from other parts,
and this admixture cannot fail to render the whole
mass of the circulating blood more pure, and
better adapted to the maintenance of the animal
functions, than it would have been otherwise. Is
it not then reasonable to suppose that this peculiar
structure enables the whale to subsist with longer
intervals between his respirations than other warm-
blooded animals? If it does not answer this
purpose, what other purpose is there for which it
can be designed? It may be observed, moreover,
that some of the principal plexuses are connected
with the vessels of the brain and spinal chord, as
if it were intended that this reservoir of arterial
blood should especially belong to these organs, to
which the dark-coloured venous blood is the most
injurious.

If an animal be taken out of the water before
he is completely drowned, and the diaphragm con-
tracts afterwards, so as to draw air into the lungs,
before the action of the heart has ceased, the action
of the heart is maintained, and the animal continues
to respire. Nevertheless, although he has recovered
from the first effects of the injury, his ultimate
recovery remains uncertain; and after drowning, as
after strangulation, there is a second period at
which death may take place. The animal lies

motionless, insensible, with dilated pupils, and laborious breathing. In the majority of instances, after a certain time has elapsed, there take place spasmodic contractions of the voluntary muscles, and these are the forerunners of complete resuscitation. But in other instances the difficulty of respiration continues ; it is performed at longer, and then at still longer intervals, until at last it altogether ceases. In fact the phenomena are similar to those which occur after strangulation, with only this difference (which is, however, one of no small importance) that there is a greater degree of coldness of the body in consequence of it having been immersed in a cold medium.

Treatment of drowned Persons.

With respect to the recovery of persons who have been rescued from the water, when on the point of being drowned, I have little to offer in addition to what I have already stated, when I called your attention to the consequences and treatment of strangulation. As the mode of death is the same, so there must be a great similarity of treatment. There are two periods at which artificial respiration may possibly be useful. The first is that short interval of time between the cessation of the natural efforts to respire, and the cessation of the heart's action. If, however, I may venture to apply to the human subject the observations which I have made in experiments on smaller animals, short as that interval is in those that are strangled, it is still shorter in those that are drowned ; and it is only in a very limited number

of the latter, and by some rare accident, that the
opportunity can occur of inflating the lungs at this
first period. The second period to which I have
alluded is that during which the patient lies in a
state of stupor, in consequence of the injurious
effects produced by the transmission of the dark-
coloured blood to the brain ; and here, when natural
respiration begins to fail, there is no doubt that
artificial respiration may be had recourse to with
advantage. But I need not occupy your time by
any further observations on the subject. It is
enough for me to refer you to the observations
which I made in my last lecture.

In patients who are recovering from the effects of
drowning, even more than in those who have been
strangled, it must be of importance to supply the
waste of animal heat by placing them in a warm
temperature. The warm bath forms a simple and
convenient method of attaining this object, and
from the accounts which I have received from
those who are more practically conversant with
the effects of drowning in the human subject than
I am, I can entertain no doubt that it produces
another good effect by promoting the natural
efforts to inspire.

Whether the abstraction of blood be ever useful
is even more doubtful in cases of drowning than in
those of strangulation, there being in the former
for obvious reasons a smaller liability to congestion
of the vessels of the brain.

On the whole it must be acknowledged that in
both orders of cases the resources of art are limited,
and that of those who recover from a state ap-

proaching to dissolution a greater number will owe their recovery to unassisted nature, than to the most judicious treatment. But let us not on this account undervalue the knowledge which physiological investigations throw on this interesting subject. The preservation of the body from the influence of external cold must be always important, where the progress of recovery is tedious; and although the cases in which the artificial inflation of the lungs can be advantageously employed are rare, yet there are occasions in which the life of a dying man may be preserved by the judicious application of this remedy. Moreover we must express our obligations to science, if she teaches us to avoid things which ignorance has suggested as useful, but which are really detrimental; or even if, by attending to her instructions, we are enabled to reject what is useless and frivolous, although not absolutely injurious. We have been directed to employ friction of the surface of the body for the purpose of assisting the circulation of the blood; as if this could do any real good when the action of the heart has ceased; or as if it would not do actual harm by overloading (if I may be allowed to use such an expression) the right auricle and ventricle, when the action of the heart was still going on. The injection of tobacco, and the application of stimulants, belong to the same class of remedies which are either mischievous or useless, proposed formerly by those who did not know what to do, but who thought that they were expected to do something, but now rejected by a more enlightened physiology.

ON THE MODE IN WHICH DEATH IS PRODUCED BY A
STROKE OF LIGHTNING.

A stroke of lightning is a shock of electricity, and of course it may produce a great variety of effects, according to its intensity, and the part of the body through which it passes.

A boy was admitted into Saint George's Hospital under the following circumstances. He had several superficial sores on his abdomen and lower limbs, and he gave the following account of their origin. In the month of July, during a thunder-storm, he was sitting with several other persons under a hovel covered with thatch. A flash of lightning struck the hovel, and set fire to the thatch; the boy, and a woman who was of the party, fell senseless. The woman was instantaneously deprived of life; but the boy recovered his sensibility after the lapse of a few minutes. He had been drawn out of the hovel before he could feel any effects from the burning thatch, and his clothes were uninjured; but shortly afterwards large vesications took place about the pubes and thighs, precisely resembling those which arise from a scald; and they terminated in a similar manner, that is, in producing ulcerations. It is evident that, in this case, the electricity must have acted chiefly on the surface of the body. A corresponding case is recorded in the sixty-sixth volume of the Philosophical Transactions. A bullock, which was pyed white and red, was exposed to a violent thunder-storm. A stroke of lightning consumed the white, but left the red hairs. In another volume of the Philosophical Transactions

is the history of a man who was instantaneously destroyed by lightning, which made a wound in his neck, and burned the surface of the body, so that the integuments resembled scorched leather. And we may suppose the destruction of the animal body to be even more complete than this, so that every organ and every tissue should be included in it.

But a stroke of lightning may also occasion death without injuring (as far as we are capable of perceiving) the organization of any part of the body. Wishing to determine in what manner the electric influence operates on these occasions, I instituted the following experiment. An electric battery of six jars being charged with electricity, the shock was made to pass through a guinea-pig, in the longitudinal direction, from the head to the tail. The animal immediately fell on one side, as if stunned. There were convulsive actions of the muscles of the extremities, which however presently ceased. The function of respiration was not interrupted. In a few minutes sensibility was restored, and the animal recovered.

In this experiment there were no marks of derangement of the vital functions, with the exception of those of the brain; and the animal suffered, as he might be expected to suffer, from concussion of the brain.

An electric battery of nine jars being charged with electricity, the shock was discharged through another guinea-pig, in the direction from the head to the tail. Immediately the animal fell on one side. There were convulsive actions of the muscles of the limbs, but it uttered no sound; and although

closely watched, it was not observed that he breathed once after he had received the shock. Three minutes afterwards I opened the chest, and found the heart acting with regularity and vigour, about eighty times in a minute, and circulating dark-coloured venous blood. The peristaltic motion of the intestines also continued. On dissection, no preternatural appearances presented themselves in any part of the body, and the muscles contracted readily when submitted to the influence of a voltaic battery.

In this experiment it was evident that the electric shock did not destroy the irritability of the muscular fibre, nor did it affect the action of the heart. Death took place precisely in the same manner as from a severe injury of the head, and the animal died manifestly from the destruction of the functions of the brain. There can be no doubt that if the lungs had been regularly inflated, the action of the heart would have been maintained; and very probably in this, as in many other instances where the cause of death operates especially on the brain, by persevering in the process of artificial respiration the animal would have been restored to life.

In a third experiment there were corresponding results, although death was not the immediate consequence of the injury. The animal lay on one side; the heart was distinguished acting through the ribs, and he continued to respire; he was totally insensible, except when roused, and then he gave some imperfect signs of sensibility, like a person suffering from concussion of the brain. There were occasional convulsive actions

of the voluntary muscles. In the evening, five hours after the experiment was made, he was still in the same condition, but on the following morning he was found dead and stiff.

It has been stated, on no less an authority than that of Mr. Hunter, that in a person killed by lightning there is an instantaneous and complete destruction of the vital principle in every part of the animal machine ; that the muscles are relaxed and incapable of contraction ; that the limbs do not become stiffened as after ordinary death, and that the body immediately begins to undergo the changes which are the result of · putrefaction. That lightning never produces such phenomena as these I am not prepared to assert ; but, in the experiments which I have just described, such an instantaneous extinction of vitality certainly did not take place. It is manifest that the functions of the brain were those on which the electric shock exercised its principal influence, and that the suspension of those functions was the immediate cause of death.

Now let us compare the results of these experiments with those of human beings who have been struck by lightning, and who have afterwards recovered.

One person* (as we are informed) felt an impulse on one side of his head, and his sense of hearing was impaired afterwards. Another person† felt as if stupified, and forced to the ground he knew not how. A third individual‡ is described

* Philosophical Transactions, vol. xxxiv.　　† Ibid.
‡ Struve on Suspended Animation.

to have been rendered instantly insensible; the pulse being strong, though irregular. In eight minutes he began to move his shoulders; and in four minutes more he articulated some incoherent words; but an hour and a half elapsed before he had entirely recovered his senses. This patient appears to have been under the care of Dr. Struve, a German physician, who published a treatise on the art of restoring suspended animation. He was bathed in cold water; and then covered over with earth, which was laid upon him six inches in thickness; vinegar was poured down his throat, and the powers of his constitution enabled him to recover, in despite of the doctor's remedies.

It appears to me that the facts which I have been able to collect relating to this subject lead to this conclusion, that the influence of lightning, or of a powerful shock of electricity, in the majority of cases, is expended chiefly in disturbing, or destroying, the functions of the brain; and the treatment necessary to counteract the effects of the injury may be comprised in a few words.

Expose the body to a moderate warmth, so as to prevent the loss of animal heat, to which it is always liable where the functions of the brain are suspended or impaired, and inflate the lungs, so as to imitate natural respiration as nearly as possible, whenever the animal breathes with labour or difficulty, or when he has ceased to breathe altogether by his own efforts.

LECTURE V.

ON SOME CASES OF CYSTS CONTAINING WATERY FLUID APPARENTLY CONNECTED WITH THE LIVER.

I PROPOSE, in the present lecture, to call your attention to the case of a little girl, who was some time since in the hospital, with a large encysted tumor, containing a watery fluid, and occupying a considerable portion of the left hypochondrium. In order, however, that what I have to say on the subject may be better understood, I shall offer to you some preliminary observations, and describe some other similar cases which I have met with in the course of my practice.

In the spring of the year 1822, I was consulted, in conjunction with a respectable medical practitioner of my acquaintance, respecting a young lady about twenty years of age, who laboured under a considerable enlargement of the parts situated in the right hypochondriac region. On examination we discovered a tumor, in which the fluctuation of fluid was very perceptible, lifting up the inferior ribs of the right side, and projecting forward so as to be visible below the edges of the ribs also. This tumor had begun to appear indistinctly a year or two before ; at first producing some degree of pain ; producing still more pain as it grew larger, and occasioning also much inconvenience to the patient

by preventing her from sleeping, except in a particular position, and from taking exercise.

The tumor continued to increase, in spite of some remedies which were recommended ; and as the inconvenience which it produced increased also, I was led, on the 27th of June 1822, to puncture it, by means of a flat trocar cautiously introduced below the margin of the ribs. About three pints of watery fluid were evacuated. Care was taken that no air entered the orifice made by the trocar. The edges of the wound were brought together by means of adhesive plaster, and they healed by the first intention.

A bandage was applied round the upper part of the abdomen, and the patient was kept in bed for the first few days after the operation.

For two or three weeks she suffered from a troublesome and almost incessant cough. As the cough subsided, she found herself to be very much relieved. She was now free from pain, was able to walk as well as other persons, and to lie in any position.

It was after the lapse of more than six years, that I was again consulted by the same young lady, but it was on account of another complaint, and I was gratified to find that there had been no return of the tumor, and that she had continued quite free from any of her former symptoms.

A few months after the occurrence of the case which I have just related, a little boy was admitted into St. George's Hospital, under Dr. Chambers, with a tumor presenting itself below the margin of the ribs of the right side, lifting up the ribs also ;

with a distinct fluctuation, and altogether very nearly resembling the tumor which existed in the case just related.

In the following September it was determined, in a consultation between Dr. Chambers and myself, that I should puncture the tumor. Accordingly, a flat trocar was introduced below the margin of the ribs, and a pint and a half of watery fluid were drawn off. The wound healed by the first intention, without the smallest inconvenience arising from the operation. The boy left the hospital as cured, and I have had no opportunity of seeing or hearing of him since.

The fluid drawn off was exactly the same in both of these cases. It was clear and colourless, resembling water in appearance. When exposed to heat in a spoon over the flame of a candle, no coagulation took place, and the fluid almost wholly evaporated, leaving the smallest possible residuum of animal matter.

From the situation of these tumors, I was led to believe that they must have been connected with the liver; and this opinion is confirmed by the circumstance of my having not unfrequently noticed in dissection a membranous cyst, projecting on the convex surface of the liver, and containing a clear watery fluid. The cysts to which I allude are generally of the size of a marble. The largest which I have met with in the dead body may have contained from one to two ounces of fluid, but there is no reason why such a tumor, being once formed, should not attain any magnitude.

Cysts which contain a serous fluid of a turbid

appearance, and coagulating with heat, are met
with in various parts of the body. Sometimes
they form a part of morbid growths of a malignant
nature ; at other times they are mere local diseases,
having nothing malignant in their character. In
some instances the cyst is a nest of hydatids,
which escape, some of them entire, and others
broken into fragments, when the cyst is opened.
But these cases are all different from those which
are now under our consideration ; in the latter, the
fluid consisted of little else than pure water, and
there were no *debris* of hydatids, as there would
have been if this had been the nature of the
disease. Besides, in a case of hydatids, according
to my experience, the evacuation of its contents is
always followed either by suppuration of the cyst,
or by an immediate re-accumulation of the fluid.

But cysts which contain an uncoagulable watery
fluid are not uncommon in other organs, as well
as in the liver. As I have told you on other
occasions, you find them in the necks of infants,
sometimes extending downwards, even within the
parietes of the chest. The true encysted hydrocele
is another example of the disease. The fluid is
colourless and watery, containing scarcely any
animal matter, and quite different from that of the
hydrocele of the *tunica vaginalis*. If you dissect
the encysted hydrocele, you find a very thin mem-
branous bag, quite distinct from the tunicks of the
testicle ; sometimes lying between the *tunica vagi-
nalis* and the *epididymus ;* at other times inter-
posed between the *tunica vaginalis* and the *tunica
alluginea*, but more frequently in the cellular mem-

brane of the spermatic chord. Here, as where the cyst is connected with the liver, although the fluid is generally very small in quantity, in a few cases it may amount to one or two pints, or even more. I was consulted concerning a little boy about six years of age who had been supposed to labour under a disease of the vertebræ. The only symptom, however, was a tumor over the posterior part of the ribs, on one side of the spine, of the size of a small orange, but of an oval shape. The mother said that she knew not how long the tumor had existed, as she had not noticed it until it had attained a considerable size, but there was no reason to believe that it was congenital. It evidently contained fluid, but had none of the usual characters of the *spina bifida*, and had very much the appearance of an abscess. On making a puncture, however, with a grooved needle, I drew off about six drachms of a clear, colourless, watery fluid, which was not the whole of what would probably have been drawn off if I had used a small trocar.

The case to which I referred in the beginning of my lecture, presents some circumstances of greater interest than those which I had met with previously. I shall read the notes of it contained in my case-book.

" Harriet Copeland, nine years of age, was
" admitted into St. George's Hospital on the 9th
" of March 1834, with a firm elastic tumor in the
" left hypochondriac region, pushing forward the
" integuments, and extending backwards, beneath
" the lower ribs, to the left side of the spine.

" No pain was felt on pressure ; the appearance of
" the skin over it was perfectly natural, and the
" patient's general health was good.   Her mother
" stated, that about a year ago the child had
" received a severe blow on the left side from her
" schoolmistress ; the pain which immediately
" followed soon ceased, and the circumstance was
" nearly forgotten, until about three weeks before
" she was brought to the hospital, when, in the
" act of running, she struck her side with much
" violence against a post ; great pain followed the
" accident, and on examining the injured part,
" a tumor was discovered in the situation which
" has been described.   At this time it did not
" seem to be larger than a hen's egg, but it rapidly
" increased in size afterwards."

" Having inquired into the case, I was led to
" believe that there was an encysted tumor in the
" abdominal cavity, and that it was probably
" connected with the left lobe of the liver.   I
" determined, however, to keep the child for some
" time quiet, and to do nothing more, so that I
" might watch the progress of the disease, undis-
" turbed by extraneous circumstances.   On the
" 30th of April the tumor had still further
" increased in size, and presented to the fingers a
" distinct sense of fluctuation ; I now punctured
" it with a small flat trocar, and drew off about
" eight ounces of a colourless watery fluid similar
" to that which had been drawn off in former
" cases."

It will be unnecessary for me to occupy your
time with the minute details of what happened

afterwards, especially as they may be seen in my clinical case book, to which you all have access. The principal facts may be briefly stated as follows:

" After the operation the patient had repeated
" attacks of vomiting. Inflammation followed, be-
" ginning at the seat of the tumor, and extending
" to the neighbouring parts. Bleeding, purging,
" and the exhibition of mercury were had recourse
" to. The belly became swollen, tympanitic, and
" tender. On the 19th of May a tumor was again
" perceptible in the same situation as the former
" one. The fluctuation of fluid was perceptible in it;
" and it was painful as well as tender to the touch.
" It had the appearance of an abscess; but while I
" was waiting for what might be the most proper
" opportunity of opening it, it suddenly disap-
" peared. On the 25th or 26th of May the nurse
" observed that pus was mixed with the fœces.
" The purulent discharge continued until the
" 29th of May, when a membranous cyst in a
" collapsed state was detected in one of the evacua-
" tions, and the discharge ceased. From this time
" the girl rapidly recovered, and soon afterwards
" left the hospital."

" On examining the cyst it was found to be of
" about the size of an orange. The coats were
" of considerable thickness, of which the greater
" part probably depended on the inflammation
" which had taken place, and on the contraction
" of the cyst after the abscess had discharged its
" contents."

We may conclude that the puncture of the cyst and the sudden abstraction of its watery contents

had excited inflammation and suppuration. That under these circumstances adhesions were formed between the neighbouring parts, that the abscess burst into the colon, and that the cyst had afterwards been discharged through the ulcerated opening.

The case has been fortunate in its result. But it must in candour be acknowledged that this good result has not been attained without considerable danger to life. There is nothing in what has occurred that would justify us in making it our object to induce suppuration in another case of the same kind; and if we compare what happened in this case, with what happened in the two cases which I attended formerly, we shall find good reason for wishing to avoid it. On any occasion when some cause of anxiety has arisen, which I would avoid in future, I always consider whether any thing in my own practice ought to have been different from what it was. Without such revision of our conduct we can never become really good surgeons. I suspect that in this instance I made an error in being over-anxious to draw off every portion of the fluid, and that in compressing the cyst for this purpose the canula of the trocar became a source of irritation, and laid the foundation of the inflammation which followed. I have seen the same thing happen in more than one case of ovarian dropsy, where the over-anxiety of the surgeon to empty the tumor completely has been followed by inflammation of the ovarian cyst, and placed the patients life in danger.

LECTURE VI.

ON UNUNITED FRACTURES.

I propose in this day's lecture to call your attention to the case of Henry Day, admitted into St. George's Hospital on the 25th of September last (1839). It is one of fracture of both bones of the leg, in which union has not taken place in the same way as under ordinary circumstances, inasmuch as it is not completed at the end of sixteen weeks. I have selected this case for our consideration, not only because it is interesting in itself, but also, because it will afford me the opportunity of making some observations on the want of union of fractures generally, and of explaining to you the circumstances under which it occurs, and the treatment which such cases require.

I shall first read the notes as entered in the clinical case-book.

" The patient is a coachmaker by occupation, " thirty-one years of age ; he says that he has been " healthy, and he appears to be so at the present " time. Fifteen weeks before his admission into " the hospital he was thrown off a carriage. His " heel came in contact with the ground, and " when he attempted to rise and walk he found " that he was unable to do so. He was carried " home, and it was then discovered that both the

" tibia and the fibula of the right leg were broken.
" The limb was placed on a pillow, a splint was
" applied on each side of the leg, and in this
" position he remained about eight weeks. But
" at this time, on examining the limb the surgeon
" found that the bones were not united. The
" patient could stand : but when he threw the
" weight of the body on the injured limb he felt
" that it gave way under him. The splints were
" again applied, and at the end of another fortnight
" I saw him, for the first time, out of the hospital.
" I recommended that splints should still be worn,
" but with a greater degree of pressure on the
" fractured bones ; and that, with the limb thus
" secured, he should be placed on crutches and
" allowed to walk, or rather to hobble about.
" After this he went into the country. At the end
" of fourteen weeks from the date of the accident
" I saw him again, and finding that still there
" was no bony union, advised him to come into
" the hospital. At the time of his admission a
" considerable degree of motion existed between
" the fractured ends of the bones, which were also
" in some degree displaced. The tibia appeared
" to have been broken about the centre, the line of
" fracture extending from within obliquely out-
" wards and downwards. The lower part of the
" bone projected above the upper, and a sharp
" point belonging to the lower portion was percep-
" tible under the skin. There was no shortening
" of the limb, and the man suffered little or no
" pain."

Such, then, is the condition of the patient, six-

teen weeks after the accident. From the quantity of motion between the bones, it is plain that there is no bony union, but I conclude that there is union by something like ligament.

The question then is, In what manner are we to proceed, so as to make the broken bones unite, and give this man ultimately an useful limb?

And in order to answer this question we must consider,

1st, In what manner do fractures unite under ordinary circumstances?

2d, What are the circumstances under which fractures do not unite?

3d, What are the various means that may be employed for the purpose of procuring the union of a fracture which has not united at the proper period?

Lastly, Which of these various means it will be best to adopt in this instance?

Union of Fractures under ordinary Circumstances.

The opinion held formerly respecting the union of a fracture—and this was Mr. Hunter's doctrine—was, that when a bone was broken, the blood became extravasated; that lymph was thrown out from inflammation; that the two broken ends of the bone became united by the coagulum of extravasated blood, and by the effused lymph; that this uniting substance became organized, blood-vessels being formed in it; and that, by and by, the vessels deposited bony matter. This is a very simple explanation of the phenomena which occur after a bone is broken; but it is too

simple: and, in fact, does not correspond with
what is found in nature.   The real process is
one of considerable complication.   I made several
experiments upon animals, many years ago, with a
view to the elucidation of this subject.   The
results are displayed in a series of preparations
contained in the museum of this hospital, and
some of which, with explanatory drawings, are now
on the table.   I had proposed at that time to
publish a paper on the union of fractures ; but
before my investigations were completed, I found
the whole matter to have been made out by Baron
Dupuytren so completely, that any farther publi-
cation on it was unnecessary.

I broke the bones of animals, and examined
the appearances at different periods afterwards.
Immediately on a bone being broken, you find a
little blood extravasated ; in general, also, the
bones are considerably displaced, and riding one
over another, owing to the animal not being
quiet, and the unrestrained action of the muscles.
For the first three or four days you see nothing
more than you do immediately after the accident
has occurred ; but after this period there is a
thickening, consolidation, and adhesion of the parts
surrounding the fracture, and these changes ex-
tend to the muscles and neighbouring tendons.
In the course of a week all these parts become
firmly united, one with the other, and there
is a soft yet firm substance, something between
ligament and cartilage in consistence, which sur-
rounds the broken extremities of the bone.   This
newly-formed substance adheres to the bone above

and below the fracture ; the neighbouring muscles and tendons are closely attached to its surface ; and the fractured extremities of the bone lie, as it were loose, in a cavity in the centre, with a small quantity of vascular albumen, resembling a semitransparent jelly.

Here, then, is a kind of splint which nature contrives, and which is nearly completed within a week from the date of the accident. We call this new formation, the callus. This process goes on : the surrounding substance becomes thicker, and of still firmer consistence ; and here is a drawing showing the appearance which the parts exhibit at the end of ten days after the accident. In the course of a few days more the thin jelly, which lay in contact with the broken ends of the bone, has disappeared, and its place is supplied by a callus continuous with that which formed the original capsule. This drawing explains the appearance which the parts exhibit at this period ; and this we may consider as the termination of the first stage of the curative process. The broken ends of the bones now are completely imbedded in a mass of vascular organized substance, or callus, something between gristle and cartilage in consistence ; and as yet there are no traces of bony matter in it. At this time, if you remove the adventitious substance, you find the broken ends of the bone retaining exactly their original figure, and presenting the same appearance, as immediately after the fracture took place.

At the end of about three weeks, if you make a section of the callus, minute specks of earthy mat-

ter are visible, deposited in it here and there ; and
at the same time some of the callus seems to dis-
appear on the outside, so that the neighbouring
muscles and tendons adhere to it no longer.   The
specks of bone become more numerous, and larger,
until they extend into each other ; and thus by
degrees the whole of the callus is converted into
bone.   This drawing represents the appearance of
a fracture thirty days after the injury.   It is taken
from the broken leg of a guinea-pig, and you will
perceive that the ossification of the callus is com-
plete.   Even at this period, however, there is not
absolute bony union, for although the whole of
the callus has become bone, it is not yet so
identified with the old bone, but that you may
still pick it off with a penknife, leaving the broken
extremities not materially altered from what they
were immediately after the injury.   This may
be regarded as the end of the second stage of the
process by which a fracture is repaired.

Now a third series of changes begins to take
place.   The broken extremities of the bone become
intimately united by bony matter passing from
one to the other.   The mass of new bone on the
outside, formed by the ossification of the callus,
being no longer wanted is absorbed.   By degrees,
the whole of it disappears, and the bone is left,
having the dimensions which it had before the
occurrence of the accident.   All these changes
are plainly to be seen in the preparations and
drawings on the table.

Thus it appears that the process by which
fractures become united under ordinary circum-

stances may be divided into four series of changes: *first*, there is the effusion of albumen, thickening and consolidation of the surrounding textures, and the formation of callus; *secondly*, there is the ossification of the callus; *thirdly*, there is a growing together of the broken bones, and the identification of the surfaces which are in contact with each other; *lastly*, there is the absorption of the ossified callus; and these changes take place in succession, in whatever manner the broken bones are in contact, whether it be by their broken surfaces, or laterally, or in any other way.

The process of union is completed in young persons sooner than in those who are advanced in life. In the upper extremities it is completed sooner than in the lower. Thus in the human subject, while it occupies six or eight weeks in the arm or fore-arm, it may occupy nine or ten weeks in the thigh or leg. In the smaller animals union takes place more speedily than it does in man.

Circumstances under which Fractures do not unite.

Fractures sometimes are not repaired in consequence of the anatomical structure of the parts in which the accident has occurred. The neck of the thigh-bone, when broken within the capsule of the hip-joint, does not become united. The fact is noticed by Morgagni, but it was not generally known until the observation was repeated by Sir Astley Cooper. It has been a question of late much agitated, whether bony union of the neck of the

femur, within the capsule, can take place, under
any circumstances; but I need not enter into
the consideration of it at present. We may be
satisfied that the union of such a fracture is, at all
events, a very rare occurrence, and that it does not
unite in the same way as ordinary fractures. The
structures in which this particular fracture occurs
explain the circumstance. The neck of the femur
within the articular capsule has a synovial mem-
brane, but there is none of that mass of cellular
membrane and muscles surrounding it in which
the process of union begins, where the fracture is in
the shaft of the bone. If any other explanation
were wanted we might refer to the small quantity
of blood which probably would enter the head
of the bone for the purpose of nutrition after
the accident had occurred. If a fracture were to
occur in any other bone, which is covered, as the
neck of the femur is, only by a reflection of the
synovial membrane, I presume that the result
would be the same. In the human subject there
is scarcely any other bone in which such a thing
can happen. There are, however, some bones
which may be broken under similar circumstances
in animals. While I was engaged in the series of
experiments to which I have already referred, the
fractures were made, as chance directed, sometimes
in one situation, sometimes in another; for, of
course, you cannot make a fracture just where you
wish to make it. In one experiment, the bones of the
leg of a guinea-pig were broken close to the ankle-
joint. The tibia in these animals is covered by a
reflection of the synovial membrane, which extends

upwards to some distance above the ankle. The fracture, then, in this case corresponded to that of the neck of the femur within the capsule; and when I killed the animal some time afterwards, there had been no attempt at union. The broken ends of the bone fitted each other so exactly that there was scarcely any motion between them. The synovial membrane was scarcely torn. The ligaments were not torn. There had been no defect of nutrition, for the cancellous structure had become harder than natural, in consequence, as it seemed, of ossification of the medullary membrane; but the fractured bones were as distinct from each other as if the fracture had been recent.

Fracture of the neck of the femur unites ultimately by a ligamentous substance; at least it does so in many instances. The ligament is sufficient to bind the bones a little together, but it makes a very different bond of union from that which would be formed by actual bone: and even this imperfect union is the result of a very slow process; not being completed for some months.

It is not merely the neck of the femur in the human subject that does not unite, in consequence of its particular structure; at least something like this may be observed with respect to the bones of the cranium. A fissure of the cranium takes much longer to unite than a fracture of the arm. I first noticed this in examining the body of a person who died in St. George's Hospital, six months after an injury of the head. I had expected to find the fissure quite united, but it proved, on dissection, there was no union at all. In the Hunterian

Museum, at the College of Surgeons, there is a specimen of extensive fracture of the skull indicating the same fact. The skull has been broken in several places. There is no displacement of the broken edges, yet there is no attempt at union. It is evident that the patient had lived a considerable time after the accident, the sharp edges of the fracture having been made smooth by absorption.

You will observe that the bones of the skull have the dura mater lining them on the inside, while on the outside there is the periosteum, and over it the tendon of the occipo-frontalis muscle, without any intervening mass of loose cellular membrane. Whether it is to this, or to other circumstances in the anatomical structure of the parts, that the want of union in fracture of the cranium is to be attributed, I cannot say; but there is no doubt as to the fact. The union which is completed in a few weeks after a fracture in other bones, in the skull may require several months, or even a longer period. However, I believe that union always takes place at last.

It has been said that diseased bones, when broken, will not unite; and I believe this *may* be the case, where there is an abscess in the bone, where there is necrosis, and in some other instances. I know, however, that the rule is not *absolute ;* and that in a great many cases, where the bone is diseased, it will unite perfectly. I had a patient who had disease of the bones ; whether it arose from syphilis, or mercury, or a cachectic state of the constitution, I cannot say ; however, some of the bones had nodes upon them, and were very much en-

larged. The principal enlargement was in one of
the clavicles, the bone being much diseased besides.
This man, in using his arm, broke the collar bone,
the fracture going through the diseased part. I
bound up the limb, and, with such knowledge as
I then had, I concluded that there would be no
union; but to my surprise it united quite as soon
as ordinary fractures. Women labouring under
cancer of the breast are very liable to scirrhous
disease of the bones. Sometimes this disease,
which is indicated by pains like those of the most
severe rheumatism, will affect nearly the whole of
the bones, which then become brittle, and very
liable to break. Such a case occurred to me
when I was a student. The patient was an old
woman, dying of cancer, and who, in turning one
day in bed, broke one of her thigh bones. I
concluded that the broken bone would not unite;
but union took place as well as under ordinary
circumstances. I attended a lady who had cancer
of the breast, and pains of the limbs, indicating
scirrhous disease of the bones. One of her
clavicles was diseased in this manner; and
one day, in moving her arm, it was broken;
but it united, just as if it had been a healthy
bone.

It sometimes happens, when a fracture has been
attended with more than usual injury, that a piece
of muscle slips between the fractured extremities of
the bone, and keeps them asunder; and, under
these circumstances, as there is not that actual
contact of the broken bones, which is necessary to
union, union does not take place. Cases of this

kind are on record, where the fact had been verified by dissection; and I have seen instances where we had reason to believe, on examining the living person, that the same thing had happened.

It is usually supposed that a great deal depends upon the limb not being kept perfectly quiet; and that if there be not a good apparatus employed, such as will fully answer this purpose, union may be prevented from taking place. I cannot say that this may not be a sufficient reason in the human subject, but it is not so in animals; for in them I have tried, over and over again, to prevent union, by giving motion to the broken bone several times daily; but it really appeared, that for the most part the process of union went on more rapidly in animals whose limbs were thus exercised than in others; and it was only in a single instance that, at the end of the time when bony union is generally completed, I found that there was no union, except by ligament.

In most instances, I cannot doubt that the want of union is to be traced to a peculiar state of the constitution. A gentleman was growing fat, and not liking to do so, he placed himself on a very spare diet, though accustomed to good living previously. After six months of starvation, he broke his arm, and the bone would not unite. I saw him many months afterwards, and there was scarcely any union, even by soft substance. Another patient about whom I was consulted, a lady, also was growing corpulent, and she also thought that she might prevent it, by pursuing a similar system of diet. Some months after-

wards she broke her fore-arm, and union did not take place. A young man had been for many months living very low on account of a complaint under which he laboured, and under these circumstances broke both bones of his fore-arm. At the end of several months there was no union. Cases of ununited fracture are not very common, yet here are three among those which have fallen under my observation, in which the want of union seems clearly to be traced to the bad state of the constitution, produced by abstinence from food. A man broke his thigh; his bowels were costive, and his surgeon allowed him to remain without an evacuation for ten days after the accident, and in him the broken bones did not unite. We cannot be certain that it was this long continued costiveness which prevented the union of the fracture, but it seems probable that it was so.

If loose bandaging may prevent a fracture from uniting, by permitting the bones to have too great latitude of motion, I think it very probable that tight bandaging may in some cases produce just the same effect. If the limb be too tightly bandaged, especially above the fracture, it must have an insufficient supply of blood; and it is reasonable to suppose, that, this being the case, the restorative process which produces union of a fracture may not take place. I have made the following experiment several times :—I have broken the thigh of a rabbit, then tied the femoral artery, and killed the animal at the end of four days, and found the parts just as they would have been immediately after the injury. I have repeated the

experiment in other animals, with this difference, that they were not destroyed until the end of the seventh day. Still there was no commencement of the process of union. But after this period, where the main artery of a limb is tied, the formation of callus begins to take place, and then the union goes on as usual. At the end of a week, it is reasonable to suppose that the anastomosing arterial branches will have become dilated, so as to make up for the obliteration of the femoral artery; but till there is time for this change in the state of the vessels to have taken place, it appears that the limb does not receive blood enough for the process of union to be established.

Appearances on Dissection of an Ununited Fracture.

The appearances which are observed when you dissect a fracture which has not united at the usual period, are different in different cases. In general, there is union by a ligamentous substance, not by bone. I say *ligamentous*, for we have no other name to give it; but it is not fibrous: it is merely like a firm, condensed albumen, which has become organized, without a distinct, fibrous structure. There are some cases in which even this kind of union does not take place; and these cases are very remarkable. A new joint is formed—absolutely a false joint. The broken ends of the bone become rounded: there is a capsule nearly as thick as the capsule of the hip-joint or shoulder; this capsule is fibrous, like ligament; it is attached to the bones above and below the fracture, and there is a cavity,

like the cavity of a joint, in which the broken ends
of the bone lie. And there is more than this: the
rounded ends of the bone being covered by a thin,
ligamentous substance, and the inner surface of
capsule being lined by a smooth membrane, like
the synovial membrane, and capable not only of
secreting synovia, but of secreting it in abundance.
The capsule is a new formation; and the synovial
membrane is a new formation also. It is not to be
wondered that a synovial membrane should be
formed under these circumstances. It seems very
easy for the system to construct a membrane of
this description. The bursæ mucosæ are made of
synovial membrane, just like that of the joints.
There is a bursa between the patella and the skin,
and this in housemaids sometimes becomes dis-
eased, and converted into a hard lump or tumor.
I have frequently removed such a tumor from the
knee of a housemaid, and some time afterwards,
on examining the limb, I have been satisfied that
the bursa had been regenerated. Nor is this a
mere supposition; I have positive proof that the
fact is as I have stated it. There was a woman
in the hospital from whose knee the late Mr. Rose
removed an enlarged bursa. A year or two after-
wards she returned, and came under my care;
and not only had the bursa been regenerated, but
the new one had become diseased like the old one,
and I had to repeat the operation which Mr. Rose
had performed formerly. She had gone back to
her former occupation, which included a good deal
of kneeling, and, under the influence of pressure,
the new bursa had become converted into the same

diseased structure as the old one. These cases of artificial joints are comparatively rare; the union by ligamentous substance is much more common.

Means to be employed for the Purpose of procuring an Union of the Fracture.

Let it be supposed that you are called to a case of ununited fracture. It is generally an object of great importance that the bones should be made to unite. I say generally, for there are some bones in which the want of union is no great evil. Here, for instance, is an ununited fracture of a rib. You will perceive that a joint is formed between the two bones, and I dare say that the patient suffered no inconvenience from it. But it is very different when the fracture is in the bones of the extremities. The first question that will occur to you is, Whether there be any thing in the constitution to account for the want of union? If there be, whatever is wrong must be corrected. One patient may require to be put on a better diet; another may require purgatives; another may stand in need of tonics. The late Mr. Wilson was accustomed to relate the case of a woman who, being a dram-drinker, had broken her leg. At first she was not allowed to take her usual drams, and the bones showed no disposition to unite. After some time she was allowed to have a certain quantity of spirit, and union took place immediately.

In the way of local treatment various methods have been recommended by different surgeons. Sometimes it appears that a very little matter will make a fracture unite, which had not united at the

usual period. In numerous instances I have known a patient in the hospital kept in bed, with a broken leg, for ten weeks or longer without union taking place ; then a splint having been placed on each side of the leg we have given him crutches, directed him to walk about, put the limb to the ground, and exercise it as much as he could with the splints on, and the fracture has become united.

In other cases where a fracture was slow in uniting I have had recourse to blisters. Mr. Sewell, of the Veterinary College, informed me of some observations which he had made on the advantages derived from this mode of treatment in horses, and it appeared to me that it was also useful where I tried it on the human subject. If this method, however, be employed at all, it should be in the course of eight or ten weeks from the date of the injury.

An operation was formerly recommended, but a very severe one, in which the surgeon made an incision on the broken ends of the bones, turned them out through the wound, sawed off a portion of each of them, put them back into their proper place as nearly as could be, afterwards applying splints and treating the case like one of compound fracture, into which, in fact, it was converted. Of course those who had recourse to this operation expected that it would produce a cure. But I have talked on the subject with surgeons of experience of the old school, who have told me, that although they had seen the operation frequently performed, they had never known it to answer the intended purpose. Some years since a provincial surgeon

of eminence communicated to the Royal Medical and Chirurgical Society an account of a case in which he believed that he had performed this operation successfully. But I have since been informed, on what I believe to be indubitable authority, that he mistook the thickening of the soft parts which followed the operation for bony union, and that the event proved that there was no bony union whatever. I believe that it is now acknowledged that the success of this operation is at any rate very problematical; and as it cannot but be attended with some degree of hazard, I do not suppose that any modern surgeon, having a moderate share of prudence, would undertake it.

Sir Everard Home used to mention in his lectures the case of a man with ununited fracture of the humerus, who was under the care of Mr. Hunter. There was an artificial joint, and Mr. Hunter having made an incision into it, introduced a spatula, scraping and irritating the lining membrane and the bone. This induced considerable inflammation, which ended in anchylosis, and thus the patient was cured.

I am not aware that this exact operation has been performed in any other case. Dr. Physick, of Philadelphia, however, has proposed what seems to be an improvement in it. He saw that the only object of Mr. Hunter's operation was to induce inflammation, and that this object might be attained equally, and with more safety to the patient, by passing a seton through the artificial joint. This method must certainly be preferable to that of Mr. Hunter, as, when suppuration has taken place,

the matter, instead of being pent up, cannot fail to be conducted outwards in one direction or another by the seton. The principle of the two operations is the same; and it is not improbable that Dr. Physick was led to the use of the seton by a knowledge of what had been done by Mr. Hunter. He had been Mr. Hunter's pupil; and this hospital has the honour of having his name in the list of those distinguished persons who, at the end of their studies, filled the office here of house-surgeon. This operation with the seton, as recommended by Dr. Physick, has been tried in this country several times; and I have myself performed it in four instances. The first was in the case of an ununited fracture of the thigh in a lad. Union took place, but not until after a very long period of time. The second time that I used the seton was in the case of an ununited fracture of the thigh in a man. The introduction of it was followed by so much disturbance of the constitution that I was led to remove it. On these symptoms having subsided, I re-introduced it; and it was now kept in for a considerable time, without any ill consequence. I think that the treatment had a very fair trial, but no cure was effected, and the patient went out with the bones just as loose as they were when he was first brought to the hospital. A third patient was under my care in this hospital, who had broken the collar bone many years before, but it had not united. There was an artificial joint, allowing considerable motion of the fractured bones. I passed a seton through the joint. It was kept in for several weeks, and a perfect cure

was accomplished. The fourth case was that of a little boy with an ununited fracture of the tibia. The seton was introduced between the bones, and allowed to remain, if my recollection be accurate (for I have not been able to lay my hand on my notes of the case), for some months, but with no advantage whatever.

Mr. Stansfield, of Leeds, performed the same operation in a case of ununited fracture of the arm, and with success. Mr. Earle also performed it on the arm, but it failed. The result of the practice in this country appears to be, that sometimes it has succeeded in the upper extremities, but that where it has been performed on the lower extremities, as far as I know, it has only succeeded in a single instance—namely, that of the patient in this hospital, under my care. Dr. Dorsey (who was Dr. Physick's nephew, and adjunct professor with him in Philadelphia), in the last letter which I had from him before his death, informed me, as the result of the operation with the seton in the United States, that it had generally succeeded in the upper limbs, but that it had always failed in the lower. He added, that in the former case, it was often necessary to keep the seton in for several months. The operation is, to say the best of it, uncertain, and the result tedious.

Another method of treatment has been proposed by Mr. Amesbury, which I believe to have been more successful than any of those which I have before mentioned; and which has this recommendation, that if it do no good, it can do no harm. Mr. Amesbury proposes to keep the

bones in a state of the most complete repose, by
means of a suitable application of splints and
bandages; at the same time that the broken extre-
mities are kept firmly and steadily pressed against
each other. By this pressure, a fresh action is
induced, and the bones are at last found to grow
together. I do not know that this firm pressure
produces the union of the bone by a process at all
like that which takes place in the first instance after
the occurrence of a fracture. It seems to be
more probable that it causes the surfaces to grow
together, without the provisional callus being
formed on the outside. However that may be, I
know that in several cases it has succeeded per-
fectly. Such was the result in three cases which
I attended with Mr. Amesbury. In one of these
the fracture was in the arm; in another in the
fore-arm; and in the third in the thigh. The
last case is remarkable in some respects. The
thigh bone had been obliquely fractured in the
middle of the shaft. The patient was supposed to
have recovered, if recovery it could be called, where
the limb was full three inches shorter than the
other. The union was so strong that the patient
could throw the whole weight of his body on the
injured limb, and in my presence hopped round
the room upon it. On a careful examination, how-
ever, there was found to be so much yielding motion
between the upper and lower portions of the bone,
that it was plain that the union could be merely
ligamentous; and the result proved this opinion to
be correct, as, after Mr. Amesbury's treatment was
concluded, the difference in the length of the two

limbs was reduced to one inch and a half. I have adopted the same treatment in two cases under my own care, one of them being that of a patient in this hospital with an ununited fracture of the arm, the other that of a private patient with an ununited fracture of the bones of the fore-arm, and in both cases with success.

In this mode of treatment the pressure must be considerable, so as to cause some inconvenience to the patient both from pain and from swelling of the limb below. But the inconvenience is only temporary. If at the end of a certain time you find that no union has taken place, still you leave the patient as well as you found him, and he has at any rate the satisfaction of knowing that you have done all that could be done for his relief.

The principle of Mr. Amesbury's practice is simply that of keeping the ends of the bones in perfect repose, and at the same time applying pressure, particularly on the broken surfaces, so as to keep them in the closest possible contact with each other. Of course no general rule can be laid down as to the mode of attaining this object. In a case of transverse fracture, one kind of apparatus must be employed, in one of oblique fracture another, and in one of comminuted fracture a third. The apparatus will also differ accordingly as it is a fracture of the arm, the fore-arm, the leg, or the thigh. In a case of oblique fracture a very simple apparatus will do all that is required. Secure the limb by fastening it to a single rather broad wooden splint. Apply a pad of thick leather on each side of the fracture, and then a tourniquet, by which

the two opposite surfaces of bone may be kept firmly squeezed against each other. By means of the tourniquet the pressure may be easily regulated, and increased or diminished as the patient can bear it. The best kind of tourniquet is not the common one, known under the name of Petit's, but one, which occupies a smaller space, invented by the late Mr. Savigny, and sold by Philp and Whicker in St. James's Street.

I do not say, however, that this method always succeeds. I had tried it in the case of the little boy whose case I have already mentioned, (on whose leg I afterwards used the seton,) and without advantage. There was another patient in this hospital on whom it was tried for a considerable time under Mr. Amesbury's observation, and no union was effected; and it appears that Mr. Amesbury has met with some cases in his own private practice, in which he has adopted it and no doubt done ample justice to it, but in which it has failed. Still it has proved a very successful method on the whole, and certainly very much more successful than any other.

Plan to be pursued with regard to the present Patient.

In this patient I shall adopt the plan recommended by Mr. Amesbury; and as there is some union by a soft substance, and as no more than fifteen weeks have elapsed since the accident ahppened, I think the chances are much in the man's favour. The patient's limb will be bound up in splints, one on each side, and compresses

will be applied upon the two broken ends of the bone, so as to press them firmly and steadily against each other. I need not describe the apparatus employed in any more particular manner, as you will have an opportunity of seeing it and examining it for yourselves. No particular constitutional treatment seems to be required. The patient has been of sober and regular habits. He was in good health before he met with the accident, and continues to be so at the present moment.

LECTURE VII.

THE disease of which I propose to treat on the present occasion, is an affection of the female breast. It is one of great interest in various ways, and among others in this : that in its more advanced stages, although it is not really of a malignant nature, it is liable to be confounded with carcinoma. It is met with not unfrequently in hospital practice, but I do not know that I should have been able to trace its exact history if I had trusted altogether to my hospital experience. In private practice it is of frequent occurrence ; yet I have not met with any description of it in books corresponding to what I have myself observed of its actual progress. You will presently see that this is easily to be explained by the disease assuming a wholly new character as it proceeds, so that if you were to look at two cases of it, one in an early, and the other in a more advanced stage, without having witnessed the intermediate changes which have taken place, you would be scarcely able to recognise their identity. Let me not, however, be misunderstood as representing that no notice whatever has been taken of the disease by surgical writers. The account which Sir Astley Cooper has given of the hydatid breast

has been taken principally from cases of this kind, and there are also some allusions to it in the Treatise on Diseases of the Breast lately published by M. Velpeau.

The first perceptible indication of the disease is a globular tumor imbedded in the glandular structure of the breast, and to a certain extent moveable underneath the skin. Sometimes there is only one such tumor ; at other times there are two or three, or many more. The examination of the breast in the living person does not enable you to determine the exact number which exist, as it is only where they have attained a certain magnitude that they are perceptible through the skin. In most instances the disease is confined to one breast, though it is by no means very uncommon for both breasts to be similarly affected.

The globular form which the tumor invariably assumes in the first instance, is a sufficient proof that it is formed of fluid collected in a cyst, and of course pressing equally in every direction. If you puncture the tumor with a grooved needle, the fluid may be evacuated so as completely to empty the cyst, and the perfect subsidence of it afterwards proves how little space the cyst itself occupies. The fluid is always serous. When the tumor is small it seems to be serum unmixed with any thing else. In a more advanced stage of the disease, some colouring matter is generally blended with it, and it may be green, or brown, or so dark-coloured as to be almost black. The quantity of fluid of course varies. In dissection, I have some-times found the cyst to be so small as to contain

scarcely a single drop. But in a more advanced stage, it is capable of containing several ounces. In two cases, in each of which I had the opportunity of dissecting a breast affected with this disease, I found small cysts, composed of a thin membrane, and containing serum, pervading the whole of the glandular structure, the intermediate parts of the breast presenting a perfectly healthy and natural appearance; and I could discover nothing more. There seems to be little doubt that the cysts are originally formed by a dilatation of the lactiferous tubes. In one of the preparations now on the table, you will perceive ˌa bristle introduced into the orifice of one of these tubes opening on the nipple, which has passed into a cyst immediately below; and it is not uncommon to find that by pressure on the tumor the fluid may be made to escape by the nipple, so that you may even expel the whole of it.

The globular form of the tumor, and the impression which the fluid within it gives to the fingers, in general furnishes you with the means of an easy diagnosis in the early stage of the disease. Where there is any doubt on the subject, it may be resolved by the introduction of a grooved needle; to this there is never any objection, and in some cases it is absolutely necessary. Occasionally the tumor is so deeply seated, with so much of the gland of the breast lying over it, that even a very experienced person may not at once recognize its nature in the first instance, and may be led to suppose that it is a medullary tumor, or a chronic abscess, or any thing else rather than what it really is.

To complete this history of the disease, as it first shows itself, I may add that the general health is unaffected, and that the patient complains of no pain, unless it be that, in some instances, there are those disagreeable nervous sensations which are apt to arise whenever the attention is anxiously directed to any one part of the body. I have never known the disease to occur previously to the age of puberty; it is rare after the middle period of life; and I am inclined to believe it is more common in single than in married women.

There are not a few cases in which no morbid changes take place beyond that which I have already described; the cyst remaining unaltered, or only slowly increasing in size during the remainder of the patient's life. But in other cases the tumors lose their globular form, and a solid substance is deposited in the breast, connecting different cysts with each other in one large mass of disease. This process may be going on for many successive years without inducing pain or much inconvenience, except what belongs to the bulk of the tumor. But the period at last arrives when other changes take place, the disease assuming a more formidable and dangerous character. The skin, being in some one part more tense and thin than elsewhere, becomes inflamed and ulcerates, and an intractable and bleeding ulcer is the consequence. Then one of the cysts, more distended than the rest, gives way, discharging its serous contents. Perhaps the opening heals, then again gives way; and this may recur several times, until at last a fungous growth

protrudes through the opening. And here the
question arises,—what is the exact nature of
changes, which, by a gradual operation, at last
converts a disease, so small and simple in its
origin, into one so extensive and complicated ?
This I shall next endeavour to explain ; and a
series of preparations on the table, with the his-
tories of the cases belonging to them, will enable
me to do so.

The first of these is a membranous cyst, which
I removed from the breast of a private patient.
It is of the size of a large walnut ; and you will
observe that about one fourth part of its cavity is
occupied by an irregularly shaped excrescence
attached to one portion of its internal surface.

Several years ago Mr. Green and myself were
present when Mr. Freeman, of Spring Gardens,
removed the breast of a female with a similar tumor
imbedded in it. The tumor was of about the same
size as that which I have just shown you ; and in
my notes of the case I find it stated, that " the cyst
" contained serum, but that about one third part
" of its cavity was occupied by an excrescence
" which grew from one portion of its inner surface.
" The excrescence had the appearance of fibrine
" which had become vascular."

The history of the patient whose case has fur-
nished us with the next preparation, and the
accompanying drawing, is highly interesting, and
illustrates many circumstances connected with this
disease.

This lady consulted me in the month of October
1837 respecting a tumor of the breast, which might
be compared as to size to a large nutmeg. It was

of a globular shape, and evidently contained fluid.
I punctured it with a grooved needle, and a yellow
serum escaped. There were no other indications
of disease. Afterwards I made a free opening into
the cyst with a lancet, and the whole of the fluid
having been evacuated, I introduced a piece of
lint, with a view to produce inflammation and the
formation of granulations on its inner surface,
which might obliterate its cavity. An abundant
suppuration and a good deal of inconvenience fol-
lowed this trifling operation. At the end of about
two months, although the abscess was not perfectly
closed, the patient, believing herself to be nearly
well, left London of her own accord. I heard
nothing of her from this time until, after the lapse
of about fifteen months, she again placed herself
under my care. In the situation of the cyst which
I had laid open there was a considerable solid
tumor, a portion of which, of about half the size
of an orange, projected through an opening in the
skin, forming an irregularly shaped fungus. There
seemed to be no other remedy that that of the
removal of the breast by an operation, to which the
patient willingly consented, and from which she
recovered favourably.*

On examining the tumor in its recent state some
remains of the original membranous cyst, contain-
ing a small quantity of serum, were found at its
basis. A large quantity of solid substance pro-
jected as an excresence from the inner surface of
the cyst, assuming a peculiar plicated or fimbriated
appearance, and a portion of this excrescence

* I heard of this patient six years after the operation, and
that she had continued well.

protruding through the skin formed the external fungus. You will see these appearances distinctly visible in the preparation, although not so plainly as before the parts were immersed in alcohol; and they are well represented in this drawing, which is made with Mr. Perry's usual accuracy. The structure of the morbid growth seems to be of the simplest kind. I can compare it to nothing else than fibrine imperfectly organized. Its existence does not seem to be limited to the inside of the cyst, a considerable mass being on the outside, in immediate contact with the gland of the breast. Previously to the operation the remaining part of the breast appeared to be in a healthy condition; but on dissection afterwards, I found imbedded in it a great number of membranous cysts, of various sizes, from that of a pea to that of a horse-bean. These cysts contained a transparent yellow serum, and were evidently of the same nature with the larger cyst which I had formerly punctured, and in which the fungus had originated afterwards.

The preparation which I now show you leads me to the history of a patient who is still under the care of Mr. Keate, in this hospital. Fifteen months ago, being then an out-patient, she had a tumor of the left breast, above the nipple, of the size of a walnut. It was globular and moveable. Mr. Cutler punctured it with a grooved needle, and ascertained that it contained serum. Soon afterwards it was found that a fluid, similar to that which had escaped by the puncture, was discharged by the nipple. From this time the tumor gradually increased in size. Six weeks ago

Mr. Keate repeated the puncture with a needle, giving exit to a large quantity of yellow serum. The tumor, in consequence, was much reduced in size, but it soon enlarged again, so as to exceed its former dimensions. On the 21st of last December, Mr. Keate made an incision into it, and the cyst was now so capacious that not less than half a pint of serum was evacuated by the wound. The serum now was tinged with blood, and a good deal of hæmorrhage followed the incision. In the course of a few days a large dark-coloured fungus was seen projecting through the wound. Under these circumstances, on the second of the present month, (February 1840,) Mr. Keate amputated the breast, and you may here see the morbid appearances which it presents.

The tumor consists of a large membranous cyst, which might have been capable of containing twelve ounces of fluid, if the greater part of its cavity had not been occupied by a great number of excrescences attached to its inner surface. These excrescences vary in size, the smallest being not bigger than a pea, while one of them is of the size of a small orange. They are covered by a thin membrane, which appears to be continuous with, and a reflection of, the inner layer of the cyst. When cut into, these excrescences present the appearance of a considerable variety of structure. Some of them may be compared to recently coagulated albumen not yet organized ; others, to imperfectly organized fibrine ; some of them have an apparent resemblance to fatty tumors, although I do not find that they actually contain any oily

matter, and one of them might, on the first view of it, be almost mistaken for medullary disease.

The tumor which is displayed in the next preparation illustrates a still more advanced stage of the disease. I removed it from the breast of a private patient in the month of November 1836. It had existed for many years; gradually, but slowly, increasing in size. You may perceive that at the time of its removal the tumor was not larger than a small orange, and that it was of an irregular shape. Near the base of the nipple is a membranous cyst, which contained two or three drachms of very dark-coloured serum. Some smaller cysts, which also contained serum, are seen in the neighbourhood; and a bristle introduced at one of the ducts of the nipple has entered one of the cysts by a smaller circular aperture. The tumor, on a superficial view of it, appears to be one uniform mass of solid substance; but on a more close inspection you find it to consist of a congeries of membranous cysts, the cavities of which are completely filled with fibrinous matter. In many of the cysts, on examination with a probe, I found this fibrinous matter to have an attachment to one part of the inner surface, lying in contact with the lining membrane elsewhere, but having no actual adhesion to it.*

* As I was on the point of revising this lecture for republication (September 1845), this patient again consulted me on account of a small tumor which had shown itself in the neighbourhood of that which I had removed formerly. I advised her to have it removed, and (as I was on the point of leaving London for a time) to place herself for that purpose under the care of another surgeon. She accordingly applied to Mr. Aston

We can scarcely doubt, that if in this case the operation had been deferred until a later period, the growths of fibrinous matter, by which the cysts were occupied, would have contracted universal adhesions to the membrane with which they lay in contact, and that the whole, with the exception of those cysts which still contained serum, would have been identified in one solid mass of substance, in which the original cystic structure would have entirely disappeared. Of this last-mentioned change, the preparation which I now show you seems to furnish an example. The patient from whom this specimen was taken was under my care in the year 1818.

Key, who has been so kind as to send me the following account of the appearances which the tumor presented. " It was solid, " containing an amber-coloured pulpy mass disposed in cells. " In one small spot there was a dark-coloured mass resembling " the fungoid tubercles that occur on the cheek, and that are of " a malignant character. The cyst containing the mass was " dense, and in one spot adhered firmly to the pectoral · muscle."

It seems to me not improbable that the recurrence of the disease in this case arose from some small portion of the gland having been left adhering to the integuments in the former operation. There can be little doubt that this happened in another case, which may be thus briefly stated. A lady consulted a surgeon of eminence on account of a tumor of the breast, which he removed by an operation. I had the opportunity of examining the tumor, which consisted of a single membranous cyst, containing a dark-coloured serum. About three years afterwards a chain of small globular tumors appeared in the neighbourhood of the cicatrix, which were removed by myself. They proved to be membranous bags, containing dark-coloured serum, similar to the original tumor. This was several years since, and there was no recurrence of the disease.

I have no notes of the early history of the case; but the disease had probably been of long duration; as, at the time of my being consulted, the breast had attained an enormous size, being not less than seven pounds in weight. She was a middle-aged person, otherwise in good health, and the skin and the axillary glands were free from disease. Under these circumstances the diseased breast was amputated. The wound healed favourably; and I heard of the patient being alive and well, several years afterwards. If you examine the cut surface of the tumor, or rather, of that portion of it which is displayed in the preparation, you will see that the greater part of it is one uniform solid mass, of which it is difficult to describe the structure in words, further than by saying, that in some parts it has an indistinct laminated appearance. There are, however, in one part of it, several membranous cysts of various dimensions, which, when first cut into, were found containing serum. One of these is distinguished from the rest by its greater size, being capable of containing several ounces of fluid, and also by it being occupied by a large excrescence, attached to one part of its inner surface, and projecting into its cavity. This excrescence is of an irregular shape, very similar in appearance to some of those which you have seen in the other preparations. In its recent state it seemed to consist of distinct masses of coagulated albumen, semi-pellucid, some of a light yellow, others approaching to a purple colour, and altogether bearing no small resemblance to a bunch of white and purple grapes.

These peculiar appearances, of course, have been destroyed by the immersion in alcohol.

Having explained to you these facts in detail, with a view to impress the subject more completely on your minds, I shall endeavour to trace, in a few words, the pathological history which they seem to establish, and which, not only as a matter of science, but in a practical point of view, it is important for you to understand. It appears, then, to be as follows :—

First : A greater or less number of membranous cysts are generated in the breast, containing serum. The latter is at first of a light yellow colour, and transparent, but afterwards becomes of a darker colour, and opaque. There is reason to believe that these cysts are formed by a dilatation of portions of some of the lactiferous tubes.

Secondly : Morbid growths or excrescences are generated from the inner surface of one or more of these cysts, projecting into their cavities. These excrescences seem to consist of albumen or fibrine, which, after some time (if not immediately), becomes organized. They are covered by a thin delicate membrane, which is reflected over them from the inner surface of the cyst ; but whether they are originally formed between two layers of the membrane of the cyst, or whether they are at first mere deposits of fibrine or albumen on the inner surface of the cyst, a thin membrane being formed on their surface afterwards, remains to be determined by future observations.

Thirdly : There is some reason for believing

that a similar growth of fibrinous substance may take place from the external surface of the cysts, connecting different cysts with each other ; but this point also may, perhaps, require to be illustrated by further investigations.

Fourthly: Under certain circumstances the cysts become completely filled up by the morbid growths, so that their cavities are obliterated, the tumor being thus converted into a solid mass, in which, however, the remains of the cysts are perceptible ; and this is the prelude to a still further change, in which the greater part of the cysts have wholly disappeared, a solid mass of an indistinctly laminated texture occupying their place.

Fifthly: If one of the membranous cysts be artificially laid open, or if it burst from overdistension with serum, the fibrinous excrescence from its inner surface being no longer restrained by the pressure of the skin, increases in size, and protrudes externally in the form of a fungus, giving to the tumor a new and more formidable character.

In this last stage of the disease, it is evident that spreading ulceration, sloughing, and hæmorrhage, the usual results of an ulcer occurring in a diseased structure, must ensue, for which our art furnishes no other means of cure than the removal of the affected parts by a surgical operation.

And this leads us to the concluding and most important part of these inquiries.

In considering the treatment of these cases, it is convenient to distinguish those in which the

disease is still in its earliest stage, presenting
itself in the form of a membranous cyst, or cysts,
containing serum, from those in which the growth
of a solid fibrinous substance has become super-
added to this simple original structure.

In the first order of cases, we may venture
to evacuate the fluid contents of the cyst by
puncturing it with a grooved needle. No incon-
venience is ever the result of this operation; and it
is often useful not only by assisting us in our
diagnosis, but also by enabling us to determine
whether any growth of solid matter, in connection
with the cyst, has yet taken place. But it is not
productive of any permanent benefit, as the fluid
is always regenerated in the course of two or three
days. I have no experience which would lead me
to recommend any further or more considerable
operation than this. It is needless to remove what
appears to be a solitary cyst, as it is always highly
probable that there are other cysts in other parts
of the breast co-existing with it, which are not
yet sufficiently developed to be perceptible through
the skin; or at any rate, that such cysts will be
formed afterwards if they do not exist already:
and as to the removal of the entire breast, it is,
under these circumstances, an unjustifiable proceed-
ing, unless it be in af ew cases in which the cyst or
cysts have attained so large a size as to be incon-
venient from their bulk. The disease, in its early
stage, causes no suffering, and may possibly, even
if left to take its own course, remain for years, or
for the whole of the patient's life, without advanc-
ing farther. Moreover there is a simple and safe

mode of treatment which, at this period, may often be employed with great advantage, being, indeed, successful in the majority of cases, causing little inconvenience to the patient, and not open to those objections to which any severe operation is always liable.

Many years ago, a lady consulted me concerning a small tumor of the breast, near the nipple, and apparently containing fluid. Not at that time knowing any thing better, I recommended that it should be removed by the knife. The day was fixed for the operation; but, in the meantime, some domestic circumstance occurred which made it necessary that it should be postponed. Under these circumstances, I proposed to the patient that she should make the experiment of applying a stimulating embrocation to the surface of the skin. This accordingly was done, and the result was, that the tumor disappeared. Some time afterwards, another lady consulted me, having a globular tumor of one breast, larger than a pigeon's egg. I punctured it with a grooved needle, and a considerable quantity of serum was drawn off. In a few days, the fluid being reproduced, the tumor, which had wholly disappeared, was as large as ever. I now applied the same treatment as in the former case; and in the course of some weeks the whole of the fluid had become absorbed, and nothing was perceptible except a slight thickening, apparently formed by the collapsed membrane of the cyst. The thickening disappeared gradually; and when I last saw the patient, five or six years after the time which I have mentioned, there

had been no recurrence of the disease. Since these cases occurred, I have had recourse to the same method of treatment in a great many instances. In the majority of them the result has been, that the tumor or tumors have entirely disappeared; in others, that, without disappearing altogether, they have become very much reduced in size; and it is only in a few instances in which the treatment was not very rigidly pursued, that it has been productive of no manifest advantage.

The application which I have generally made use of on these occasions is the following:— R *spiritûs camphorati, spiritûs tenuioris, āā.* ℥ iijss; *liquoris plumbi diacetatis,* ℨj.; *fiat embrocatio.*

I have directed the patient to soak a piece of flannel, once folded, in this embrocation, and to apply it so as to cover that part of the breast in which the tumor is situated, renewing the application six or eight times in the day and night, until the skin becomes inflamed; then to omit the application for two or three days, but to resume the use of it as soon as the inflammation has subsided. The period of time during which it is necessary to pursue this method of treatment varies in different cases. In some, all that can be desired is accomplished in the course of three or four weeks; in others, it must be continued, with occasional intermissions, for some months. Other stimulating applications may be occasionally substituted for that which I have just mentioned. Several blisters may be applied in succession; each of them being kept open for a few days with the savine cerate; or a solution of ℨj. of iodine in ℥j. of alcohol may

be applied to the skin once or twice daily, by means of a large camel's hair brush. On the whole, however, I am led to believe that the embrocation is more efficient than any thing else.

A question may here arise as to the *modus operandi* of these local applications. They do not seem to be of any service until the inflammation on the surface of the skin has in some degree pervaded the substance of the breast itself; and hence I am led to suspect that they owe their efficacy to a new action being excited in the membrane of the cyst. My experience of what happens in cases of encysted hydrocele has led me to hesitate as to the injection of stimulants into the cyst, or the employment of any other very active means of exciting inflammation of it; and, indeed, such a mode of treatment seems scarcely to be called for, as no small degree of inflammation sometimes follows the application of the stimulants externally. A lady had one of these tumors rather deeply seated in the breast. I punctured it with a grooved needle, and a considerable quantity of serum escaped. Whether it was that I took more trouble to squeeze out all the fluid contained in the cyst than usual, or that the embrocation applied afterwards excited more inflammation than usual, or that there was something peculiar in the state of the patient's constitution at the time, I do not know; but either from one or another of these causes, or from the whole of them combined, it so happened that a great degree of inflammation followed. The whole breast became swollen, tender, and painful, with no small degree of constitutional

disturbance; suppuration of the cyst followed, and an abscess presented itself externally, which having been opened continued to discharge matter for some time, and then gradually healed. The ultimate result was, that the induration consequent on the inflammation disappeared, and that no signs of the disease remained.

But such simple modes of treatment as are useful in the early stage of the disease are wholly inefficient after the growth of solid substance is begun. In this more advanced period of the disease, no good is to be expected, except from the removal of the entire breast; and such an operation may be had recourse to with every prospect of success.

The disease seems to be entirely local. It belongs to the breast, and to nothing else. It does not contaminate either the skin or the lymphatic glands; it is not complicated with any corresponding disease of the viscera; and all the experience which I have had justifies the conclusion, that if care be taken that no portion of the breast be allowed to remain, we need not be apprehensive of its recurrence.

A careful observer will find little difficulty in distinguishing cases of this disease from those of the other diseases to which the breast is subject. It is, however, desirable, with a view to a more ready and accurate diagnosis, that we should consider what are the diseases with which it is most liable to be confounded. The principal of these are as follows:—

First: A thin membranous cyst, containing a

transparent watery fluid, without coagulable matter, is occasionally found in the breast, which may be compared to the membranous cysts, containing pure water, which are sometimes met with in connexion with the liver (of which I have given an account elsewhere), and to the encysted hydrocele of the spermatic cord or testicle. This disease is probably rare, as only two examples of it have fallen under my observation. In one of them the cyst was extracted by an operation; in the other, the nature of the fluid having been ascertained by means of a puncture with a grooved needle, the tumor afterwards disappeared under the use of a stimulating embrocation.

Secondly : A cavity is sometimes formed in the breast, containing one or more genuine hydatids. Here there is a single fluctuating tumor, which gradually increases to a large size. If it be freely opened, the hydatids escape, and the cavity in which they were lodged becomes an abscess, which slowly contracts and heals.

Thirdly : In a more advanced stage of the disease, it is not unfrequently mistaken for carcinoma; and I have no doubt that a large proportion of the cases in which it has been supposed that an operation has effected a permanent cure of the last-mentioned disease, have been in reality of this description.

The disease which I have been now describing is undoubtedly not malignant, in the proper acceptation of the term. It may go on to inflammation and ulceration, and the ulcer may spread and slough and bleed, but it does not contaminate

the constitution. Still, I am not prepared to say that it may not, under certain circumstances, and in peculiar constitutions, assume a malignant character; this being no more than may happen to almost any morbid growth. I may refer you to what I have said on another occasion, in reference to the malignant degeneration of the common fatty or steatomatous tumors; and also to my lectures on the diseases of the urinary organs, whose you will find an account of a case in which the indurated deposit connected with a *fistula in perineo* was affected with carcinoma; and the patient died in consequence.

I have hitherto confined myself to the description of the origin, progress, and treatment of this disease of the breast, without venturing to give it a name.

It is, however, necessary that we should have the means of distinguishing it in conversation and in writing; and I would suggest " the sero-cystic tumor of the breast " as being an appropriate appellation, preferable, at all events, to a mere arbitrary term; inasmuch as it expresses, with sufficient precision, the character which the tumor possesses in its origin.

LECTURE VIII.

ON VARICOSE VEINS AND ULCERS OF THE LEGS.

" MARY ANN RICHARDSON, 48 years of age, was
" admitted on the 11th of October with ulcers on
" the legs. She has a group of three ulcers, each
" about the size of a shilling, situated in the mid-
" dle of the left leg, on the outer side, with livid
" edges and flabby granulations, slightly elevated
" above the level of the skin, and discharging pus
" tinged with blood. There is another ulcer, of
" the same size and description, but with small
" indolent granulations, above the inner malleo-
" lus. These ulcers are reported to have com-
" menced each with a small pimple, followed by
" a superficial abrasion of the surface, discharg-
" ing a watery fluid, and afterwards extending into
" an ulcer. There are cicatrices from previous
" ulcers on the leg, and also the appearance of
" some of them in the first stage of their formation.
" She has suffered from these ulcers for nine
" months, and for some years from varicose veins,
" of which there are clusters on both sides, and
" smaller ramifications of them over the limb.
" The skin of the lower two-thirds of the leg has
" a dark stained appearance, with a defined margin."

This is a case in which there is no question
about the patient's life or death, and I think it

very probable that many among you may pass by
the bed-side of such a patient without thinking it
worthy of attention. But I am not disposed to
regard it in this manner. Although the patient
will not probably die of this disease, yet, without
great care, it may render her miserable. The
disease may be very much relieved by art, and it
is one of very common occurrence. You examine
carefully a case of aneurism, a case of stone in
the bladder, and so on ; but these are things com-
paratively of rare occurrence, and which, at any
rate, will not fall under your treatment in the
beginning of your professional lives. But here is
a case of a very distressing nature, and such an
one as may meet you at every turn of your prac-
tice ; and your reputation in early life will depend
more upon understanding a case of this kind,
than upon your knowledge of one of more rare
occurrence.

I have no doubt that the ulcers of the leg in
this case depend upon the varicose veins. These
are what we call *varicose ulcers*. In order that
you may understand this particular case, I shall
make some general observations on varicose veins,
and the ulcers to which they give rise. I shall
first speak of the disease, then of the treatment
required ; and I shall leave you to apply the
observations which I have to make to the case now
before you.

By a varicose vein, I mean a vein which is un-
naturally dilated. When there is increased growth
of any part, the arteries increase in size to take
the blood to it, and the veins increase in size to

take the blood from it. This is a healthy increase of the veins, and we do not call these veins varicose. But by a varicose vein I mean a vein which has become preternaturally dilated, without the dilatation being instituted to answer any good purpose in the animal economy.

Varicose veins occur principally in three situations; in the legs; in the spermatic cord, where the disease is called *varicocele* or *cirsocele;* in the rectum, and about the anus, where the disease takes the name of *piles*, or *hæmorrhoids*. I will explain to you, by and by, why they occur in some situations more than in others. But varicose veins occasionally occur in other parts of the body. I have seen varicose veins of the fore-arm to a considerable extent. In the case to which I allude, there had been inflammation of the median cephalic and cephalic vein. These veins had become obliterated, and, in consequence of their obliteration, the blood did not easily return from the fore-arm; so that the veins became varicose.

A man was admitted into the hospital who had varicose veins all down the right arm, and to a considerable extent down the right side of the chest. He had difficulty of breathing, and cough. One day he felt as if he had received a blow on one side of the chest, and immediately a large abscess presented itself externally, as big as an orange, which had evidently made its way from the inside of the chest through one of the intercostal spaces. Immediately upon the appearance of this swelling, the varicose veins disappeared. The man died, and on examining

the body after death, it was found that there was
disease in the bronchial glands; suppuration had
taken place in them, and a large abscess had been
confined in the inside of the chest, which pressed
on the right subclavian vein, and this caused the
blood to stagnate in the veins in which it had its
origin, and which had in consequence become
varicose.

In another case, that of a private patient, whom
I attended with Dr. Roots and Mr. Diamond, the
superficial veins of the chest and upper extremities
were extensively varicose, while the more urgent
symptom was a great difficulty of respiration. The
disease ended fatally; and on examining the body
Mr. Diamond discovered a large medullary tumor
within the chest, which, by its pressure on the
lower part of the trachea and on the junction of
the two subclavian veins, had obstructed at once
the entrance of the air into the lungs and the
return of the blood to the superior vena cava.

In the first of the three cases to which I have
just referred, I have said that the varicose disease
of the fore-arm was the consequence of inflamma-
tion and obliteration of the larger venous trunks;
and such is sometimes the cause of varicose veins
of the legs. There was a man in the hospital,
with varicose veins of the legs. It was one of the
worst cases of the kind that I ever met with. He
had been, however, admitted into the hospital on
account of another disease, of which he died. I
examined the body after death, and found an
obliteration of the external iliac vein. This vein
had been inflamed at some former period, and had

become converted into a thick hard cord. The blood could not return to the heart through this venous trunk, and the consequence was that the branches below became varicose. Pressure on a venous trunk in the abdomen may produce the same effects, as may be often observed in a woman during pregnancy. When she has been brought to bed, and the pressure of the uterus is removed, the varicose veins in a great measure disappear. When she becomes pregnant again, the varicose veins recur; she brings forth another child, and they in a great measure subside, but not so completely as before. Every time she is pregnant the varicose disease of the veins becomes aggravated, till at last it exists to a great extent in both legs.

There are undoubtedly some cases in which we may trace varicose veins of the lower extremity to pressure or obliteration of the venous trunks; but in the majority of cases we cannot trace the disease to these sources. It appears to be the result of a mere weakness in the coats of the veins, rendering them incapable of supporting the weight of the column of blood between them and the heart. You will understand, then, why, when the coats of the veins are weak, persons of particular habits, or of a particular physical construction, are more liable to varicose veins of the legs than others. One who is always upon his legs, always standing or walking, is much more liable to have varicose veins of the legs than another who leads a more sedentary life, because there is here a column of blood almost always pressing on the veins below. Sir Everard Home has observed, that in the army

the grenadier companies are especially subject to varicose veins, they being taller men than the other soldiers. Cooks are very subject to varicose veins, and the reason is plain. If you put one hand into warm water, and the other into cold, you know that the veins of the former will become dilated, and that those of the latter will contract.

But where the disposition to the disease exists, do all the veins become dilated? By no means. The deep-seated veins never become varicose, because there is the pressure of other organs upon them on every side, which prevents their dilatation. It is only the superficial veins that are thus affected; especially the branches of the *vena saphena major*, but sometimes of the *vena saphena posterior*. But the valves do not increase with the dilatation of the vein; they remain of their original size. The consequence is, that the valves do not protect the venous branches below from the pressure of the column of blood above; that they do not answer the purpose of valves any longer; and the want of action in the valves tends, of course, to aggravate the disease. By and by the valves seem to become changed in structure; they are shrivelled, and become at last good for nothing, not even looking like valves. This is in conformity with a general law of the animal economy. A part which is not used wastes. If you were to tie up one eye, and cover it from the light for many years, you would find at last that you could not see with it. Muscles not used will waste; and so it is with all other organs.

In a few instances varicose dilatation of the

veins comes on rather suddenly. I have known cases in which the veins in both legs became varicose immediately after very hard walking. But, in general, the disease comes on slowly, and increases gradually. At first one or two veins are a little dilated, and you see the dark blood of a blue colour through the skin. Then other veins assume the same appearance; and by and by you find clusters of varicose veins in different parts of the leg. The skin is elevated by the clusters underneath; and being stretched and rendered thin, it allows the dark colour of the blood to be seen through it. The varices are most frequently situated about the inner ankle, and the inner side of the leg; but they may occur any where else; at the back or outside of the limb. Then, as the disease proceeds, it extends to the trunk of the *vena saphena major,* which becomes dilated all the way up to the groin. Sometimes the *saphena major* is as large as your finger, assuming a knotted appearance; the explanation of which is, that varicose veins are not only increased in diameter, but in length, and of course must then be made tortuous; and where the saphena vein is twisted, as it were, upon itself, it assumes the appearance which I have mentioned. The dilatation of it is perceptible when the patient stands erect; but when he lies down the varicose appearance vanishes, because then the vein becomes emptied of its blood.

While these changes take place in the condition of the veins, the patient experiences more or less inconvenience. Sometimes he suffers from a sense

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of itching and weight, especially about the inner ankle. The sense of weight and fulness becomes more troublesome when he takes a long walk, and is then, indeed, very distressing. Where there is a varicose cluster, there is in a few instances extraordinary pain, which, as I imagine, arises from there being some nervous filament pressed on by the tumor. Sometimes he complains of being subject to cramp in the muscles of the leg, especially after a long walk. Varicose clusters occasionally burst and bleed. I said, in the commencement of the lecture, that the disease is not dangerous, but that is not absolutely and universally correct. There are a few cases in which there is actual danger to life, from hæmorrhage. A varicose cluster becomes larger and larger; the skin over it becomes more attenuated; at last it gives way, and there is a discharge of blood. I have heard of patients actually dying from this hæmorrhage, where assistance could not be procured; and I have myself known instances of very large quantities of blood being lost in this manner.

Clusters of varicose veins sometimes become inflamed. They are then tender to the touch. Frequently the inflammation is preceded by a rigor, or by an attack of fever. In some instances the inflammation extends to the skin over the cluster. It becomes red; and if the patient stands up, the pain from the inflamed varix is aggravated, but if he lies down, it is in some measure relieved, but not entirely. The great pain in the erect posture is explained by the weight of the column of blood pressing on the tender parts.

In some cases inflammation of an inflamed vari-
cose cluster will end in suppuration, the bursting
of the abscess being followed by an ulcer. But
that is not the way in which ulcers connected with
varicose veins generally begin. For the most
part, the effect of inflammation of a varicose cluster
is not to produce either abscess or ulcer. It is
very remarkable that the blood in inflamed vari-
cose veins coagulates, and they become choked
up with the coagulum. There seems to be some-
thing in an inflamed vein that is unfavourable to
the fluidity of the blood which it contains. You
observe this not only when varicose veins of the
legs are inflamed, but when veins are inflamed
under other circumstances: as in a case of piles.
A patient comes to you with an external pile,
which is large, and very tender—it is inflamed.
At first it contains fluid blood, but in a day or
two it becomes filled with solid matter; and if you
slit it open, you find a solid lump of dark-coloured
fibrine. If you slit open an inflamed varicose
cluster in the leg, under these circumstances, you
will also find that the cavity is filled up in like
manner with coagulated blood. I mention this,
that you may know what takes place in these
inflamed veins, not recommending the practice,
which is quite wrong, as I shall explain by and
by. The effect of such inflammation is to give the
patient a good deal of pain at the time, but he is
benefited by it afterwards. The coagulum fills up
the vein, and the vein becomes obliterated. Other
varicose clusters may appear afterwards, but this
one is cured. So in the case of an inflamed pile,

other piles may form, but the first is cured, and
never troubles the patient again. By degrees the
inflammation subsides ; the coagulum becomes
gradually absorbed ; as the absorption proceeds,
the sides of the vein approximate, and it assumes
the appearance of a narrow cord.

In old cases of varicose veins, you will frequently
find the skin become affected with a chronic inflam-
mation ; that is, it will look red, and be very irri-
table and tender.   Sometimes the cuticle is as it
were abraded, and an ichorous discharge takes
place from the red cutis.   Occasionally the whole
of the skin of the leg is in this condition.   In
other cases there is a chronic inflammation of the
cellular membrane.   There is an effusion of serum
into it, and the limb becomes œdematous.   When
there is disease of the heart, preventing the due
passage of the blood through its cavities, the fluid
part of the blood is liable to escape from the
capillary vessels, and thus you have anasarca of
the legs.   But the swelling which takes place in
varicose veins does not exactly correspond to ana-
sarca connected with disease of the heart. It is the
result of an inflammatory action in the cellular
membrane ; and the fluid has a more distinctly
serous character.   If you puncture the parts with
a needle, the fluid, being of greater consistence,
does not flow out so rapidly as the thinner fluid
which escapes after puncture in a case of anasarca.

The inflammation of the skin, and the inflam-
mation of the cellular membrane, in these cases
correspond with each other.   There is an exuda-
tion of serum in one case from the surface of the

skin, and in the other from that of the inflamed cellular membrane; and these inflammations are analogous to what we meet with in other cases of venous congestion.

But in some instances you find inflammation taking place of a different kind, in the cellular membrane, immediately surrounding the varicose cluster. The cellular membrane becomes infiltrated with coagulated lymph, so that the varicose cluster is, as it were, imbedded in a mass of solid substance. At first you would suppose that these veins are obliterated, but they are not so. The lymph which has been deposited becomes organized, and the coats of the vessels are thickened, but they remain pervious nevertheless, containing fluid blood, which may be perceived with the finger flowing freely through the gristly mass. Where there is this deposit of lymph in the cellular membrane round the vein, the skin becomes inflamed near it, and this may give rise to a troublesome ulcer.

The more usual history of a varicose ulcer, however, is as follows: The skin is distended at some point, and a scab forms upon it. When the scab comes off, there is an ulcer, and the ulcer spreads. The varicose ulcer, in most instances, begins about the inner ankle; but it may occur, as in the patient whose case is now before us, in other parts of the leg.

Varicose ulcers, in most cases, have a well-marked character, for which, however, you are not at this time to look in this patient, who has been confined to her bed for nearly a week. For the true character

of varicose ulcers, you must examine the legs of
a patient who has been walking about up to the
time of your seeing him.   Such ulcers are in-
clined to assume an oval form, the long diameter
of the oval extending in the course of the vein
upwards and downwards.   They are generally
nearly on a level with the surrounding skin.
The surface of them is dark-coloured when the
patient is erect, and when the small veins are
filled with blood; but when the patient lies down,
it becomes florid; the change taking place very
speedily from dark to florid, and from florid to
dark.   The skin, and the margin of the ulcer, are
generally of a dingy-red colour, and partly de-
prived of the cuticle, so that it is often difficult to
say where the latter terminates and the ulcer
begins. Varicose ulcers are generally very irritable
and painful. If the patient be very much upon his
feet they assume a foul and sloughy appearance,
and not unfrequently are disposed to bleed.

Having enumerated the principal circumstances
which deserve your notice respecting the history
of varicose veins of the legs, I shall now offer
to you some observations respecting the treatment
to be employed.

Why is it that the superficial veins enlarge, and
not the others? Because, as I have already ex-
plained, the deep-seated veins have pressure made
upon them on every side, but the superficial veins
have not.   The first thing for you to consider in
the treatment is, whether you cannot in this

respect put the superficial veins, which are dilated and varicose, under the same circumstances with the deep-seated veins. This may, indeed, be accomplished by applying a bandage to the leg. And what kind of bandage? In many cases where the disease is limited, you may apply merely a partial bandage of adhesive plaster, which will answer the purpose perfectly, giving the patient scarcely any inconvenience. There being, for example, only two or three varicose clusters of small size, you need not trouble the patient with a complete bandage for the whole leg. Have some stripes of adhesive plaster, three or four inches long, according to circumstances, and one inch or an inch and a half wide. First of all, let the patient stand erect, that you may ascertain exactly where the varicose clusters are situated. Having marked the place, let him recline, with the foot raised so that it may be the most elevated part of the whole body. Then, the varix having been thus completely emptied, apply one of the pieces of adhesive plaster across the varicose vessels, and afterwards apply the others in the same manner, drawing up the skin under them, and taking care that the plaster is not thrown into folds. The plasters being applied in this manner, and being strained on the skin beneath, prevent the vein from becoming distended when the patient stands erect. In a great many instances you will find that this is sufficient to give all the support required; and perhaps it is all that will be required for the rest of the patient's life. A lady consulted me, formerly, with two or three varicose clusters

on the inner ankle and on the back of the leg, but with no varicose veins of any consequence elsewhere. I put on some pieces of plaster in the manner which I have described. I mention this case only for this reason—that I recommended the treatment seven or eight years ago, and that lately, when she came to London to consult me on another disease, she told me that she had worn the plaster up to this time, that it had given her complete relief, and that she had never had occasion for any thing else.

Where I recommend this use of the adhesive plaster, you will, of course, understand that other kinds of plaster than that to which this name is commonly applied will answer the same purpose. In some cases of varicose veins the skin is irritated by the resin which the common adhesive plaster contains, and you may then substitute for it the red plaster (the *emplastrum thuris* or *emplastrum roborans* of the old dispensatories) with a small admixture of soap-cerate : or, what is better still, the soap-plaster spread on the *fungus* or *amadou* used for the lighting of cigars. This was first recommended to me by Mr. Weatherfield ; and it is very convenient, as, being to a certain degree elastic, it admits of being applied in a single piece, and makes a very uniform pressure.*

In those cases, however, in which the veins of the leg are extensively varicose, this partial com-

* This plaster is sold by Mr. Weatherfield, in Henrietta Street, Covent Garden. It is useful on many other occasions, among which I mention those in which a protection is required for the parts subjected to pressure in bedridden patients.

pression will not be sufficient, and then you must apply a bandage for the whole leg. There are different kinds of bandages, and sometimes one sort will answer best, and sometimes another. You may use a common roller of coarse unbleached calico, such as we use in the hospital. In some persons you will find a flannel roller more convenient; at any rate, the patient can apply it better for himself. In private practice I frequently recommend a bandage which is made of stocking web. This is very convenient, being easily applied, and making a very equal pressure; but it cannot be well used by the poorer classes of society, being more expensive in the first instance, and being also good for nothing after it has been washed a few times. There is another kind of bandage, made altogether of the India rubber or caoutchouc web, in the form of a roller; but it confines too much the heat of the legs; and, moreover, does not in most instances afford a sufficient support to the weak vessels.

I must here make a few observations respecting the use of the roller. It should be applied from the foot upwards. It need not be worn at night, when the patient is in the recumbent posture, but it should always be replaced as soon as he rises in the morning. Care should be taken that the heel is supported, as well as the rest of the foot; and that a moderate, but equal, pressure be made on the whole limb. Especially the pressure above ought not to be greater than that below; for in that case the veins below must necessarily become distended. A tight garter increases varicose veins; and the patient ought to be told not to wear a

garter at all, but to loop up his stocking. A
bandage which is tighter above than below cor-
responds to a tight garter.

But some persons cannot well apply a bandage
for themselves, and for them you may prescribe a
laced stocking, which is in many respects very
convenient. Those who are awkward in applying
a bandage may manage the laced stocking very
well for themselves. Laced stockings are made of
various materials. The Chinese manufacture a
calico called *nanquin*, which is a very good material
for the purpose. Some laced stockings are now
made *partly* of Indian rubber cloth, so that they
are elastic. An ingenious artist in Jermyn-street
makes a laced stocking of spiral wire, like the
springs of braces, but of very fine texture, included
between two folds of leather or something else.
Whether you use spiral wire, or caoutchouc, it
is not necessary that the whole of the stocking
should be made of the elastic substance ; elasticity
being required only in a part of the circumference.
In most cases I find the caoutchouc cloth to be the
best of these elastic materials. Patients complain
of the elastic wire cloth being very hot ; moreover
it makes more pressure than is required, and the
spiral wires not unfrequently break and prick the
legs. In consequence of these objections, although
this kind of bandage is very useful on many other
occasions, I do not much recommend it in cases
of varicose veins. With respect to the caoutchouc
cloth, I ought not to omit this observation :
although it is very useful where it forms only a
portion of the circumference of a laced stocking,

if it formed the whole of it, it would be liable to the same objection as the caoutchouc roller, namely, that of not affording sufficient support, especially in warm climates and in hot weather.

The foregoing observations relate to the general treatment of varicose veins, and of the simpler form of the disease. We are next to consider the treatment under peculiar circumstances.

Let us suppose, then, that you are called to a patient in whom there is a varicose cluster of veins in a state of inflammation. There is a great deal of tenderness in the part, and perhaps some fever. The first thing you have to do is to keep the patient in bed, in the horizontal posture, so as to keep the veins emptied of their blood. Then, if there be much inflammation, and the patient suffers a good deal of pain, he may derive benefit from the local abstraction of blood. You may have recourse to leeches. Do not, however, apply them immediately over the veins; they should be applied higher up on the leg, on the sound skin. The bite of a leech over an inflamed vein will give the patient a good deal of pain, and the little wound will be difficult to heal. If you apply the leeches on the sound skin in the thigh, or the upper part of the leg, you will relieve the varicose veins just as much as if you had applied them on the veins themselves, without giving the patient pain at the time or trouble afterwards. A compress wet with cold lotion may be laid on the varix, unless the pain be very great, in which case fomentations and poultices may be had recourse to instead.

When inflamed varicose veins are distended with coagulum, it used to be the practice formerly to slit open the vein, and turn out the coagulum : but this is not the treatment that I should recommend. It is, in fact, very bad practice ; and in order to impress this observation the more upon your minds, I will mention a particular case, which I found this morning in looking over one of my old case books. It occurred upwards of twenty years ago. A patient was admitted into the hospital with two or three large clusters of varicose veins. They were all in a state of inflammation ; but the inflammation was greatest in the upper one. The patient said that she had had the disease for some years, but that about a week before her admission she had stood for a long time upon a stone floor, on a cold damp day. She went to bed, and had a shivering, which was followed by fever, and then this attack of inflammation of the veins took place. I could feel that the blood had become coagulated. I slit open the upper varix and let out the coagulum ; but the varices below were treated with cold lotion, or in some other simple way. Under this treatment the inflammation very soon subsided in the varicose clusters below, the absorption of coagulated blood began to take place, and they were speedily cured. But observe what happened in the varix which I had punctured. The puncture became an ulcer, which would not heal. At the end of six weeks, when the other clusters were well, there was a bad sore here. I was obliged to make a slough with caustic potash, which I suppose destroyed the remains of the vein which

had been laid open. The slough came away, the sore assumed a healthy character, and got well, but certainly the patient would have been well some six or eight weeks sooner, if I had pursued the same practice with the upper varix which I adopted with the lower ones.

The treatment then of these clusters of inflamed varicose veins should be as follows : lay the patient in bed ; put a cold lotion on the part, or fomentation and poultices if you find these to be more comfortable to the patient ; administer purgatives according to circumstances ; and if there be much inflammation, but not otherwise, apply leeches to the sound parts above. Nothing further is necessary for their cure.

LECTURE IX.

VARICOSE VEINS AND ULCERS OF THE LEGS—
continued.

IN those cases, in which from long neglect of varicose veins the skin of the legs has become inflamed, you will be able to render the patient no service so long as he is going about, standing, and walking as usual. The first thing to be done is to confine him to his sofa, or, what is still better, to his bed, so that he may never quit the horizontal posture, and that the blood may never have to flow in the veins against its own gravity. In some instances nothing more than this is required; but in others mere rest will afford but very slow relief, and in all cases you may hasten the patient's recovery by combining with it other methods of treatment.

I have frequently, in these cases, bled the patient in the *vena saphena major*, in the lower part of the thigh, near the inner condyle; and it is astonishing what relief this gives. It is not worth while to adopt this practice in all cases, but where you find the patient suffering more than usual from the inflamed state of the skin you may very properly have recourse to it.

Bleeding in the *vena saphena major* is performed very easily in persons who are not very fat; place

a ligature round the lower part of the thigh, let the patient put his leg into a pail of warm water, and, between the warm water below and the ligature above, the *vena saphena* becomes distended; you then open it with a lancet, and take away any quantity of blood you please. But, in a very fat person, bleeding from the *vena saphena* is not very easy to be accomplished; and as a substitute for it you may apply leeches to the inside of the thigh. You may also apply them in this situation in other cases in which you do not think that actual bleeding in the *vena saphena* is required. And here I must repeat what I said respecting the application of leeches in my last lecture. Never apply them over the inflamed part, but always at some distance above it. If the whole skin of the leg be inflamed, then apply them on the inside of the thigh; if the leg be inflamed in the lower part and not in the upper, then apply them in the leg, but above the inflammation. Besides the application of leeches, you may, in the first instance, apply a rag, wetted with cold spirituous or saturnine lotion. When the inflammation of the skin has subsided, you may begin the use of bandages in the way which I described in the last lecture.

In some cases, as I formerly told you, the skin is not only inflamed, but more or less excoriated, the cuticle being abraded to a greater or less extent, while the surface of the cutis secretes an ichorous fluid. Here, also, you may take away blood from the *vena saphena major*, or from the inside of the thigh by leeches. The patient will

also derive benefit in some cases from the application of a saturnine lotion, while in others some mild cerate answers the purpose better. The zinc ointment, or calamine cerate, answers very well ; but we use, in the hospital, a preparation known with us by the name of compound lead ointment, which is much preferable. It is an excellent application in these, and other cases where the surface of the cutis is deprived of the cuticle. This ointment was invented by Dr. Kirkland, a celebrated practitioner many years ago in Leicestershire, and it has been long known under the name of Kirkland's neutral cerate. It is composed of diachylon plaster, olive oil, chalk, and distilled vinegar. How it should have occurred to any one to make such a composition as this I do not know, but the composition having been invented, I must say it is a very useful one. The ointment should be spread on linen rag, and applied in stripes round the leg, each stripe overlapping the one below. In some cases, in addition to the use of the compound lead ointment, you will find advantage from washing the surface with a solution of nitrate of silver, in the proportion of two grains to an ounce of rose water. A strong solution would here be improper, while a weak solution is useful.

I told you that in some cases there is œdema, or swelling of the leg and foot, in consequence of the inflammation of the cellular membrane causing it to be infiltrated with coagulated lymph and serum. The treatment that is required under these

circumstances is very nearly the same as that which is necessary where there is the mere superficial inflammation of which I have just spoken. The patient should be kept in the horizontal posture; blood may be taken either from the *vena saphena major*, or by leeches from the thigh, and generally you will find the latter quite sufficient. You may apply a cold lotion in the first instance, but very soon you should begin to apply a bandage, such as will give an uniform support to the leg from the toes to the knee.

In some cases in which the cellular membrane has become infiltrated with serum to such an extent as to cause more than ordinary swelling of the limb, and tension of the integuments, some immediate relief may be obtained by making punctures with a needle (a common worsted needle is the best), as in cases of anasarca. As, however, I have already observed, the fluid, being serum, and the result of inflammation, is different from that of anasarca. It flows less freely, and the relief which this practice affords is only temporary, unless other means are combined with it.

In cases of varicose ulcers of the leg, if you find that the patient has neglected himself, that the ulcer is in a state of inflammation, foul and painful, as it often is, the surrounding skin being in a state of inflammation also, you must keep him in bed, and treat him as if the leg were inflamed without the existence of the ulcer. In one case you may find it convenient to apply a bread-and-water poultice; in another, lint soaked in water with some oiled silk over it; and in another the

unguentum elemi compositum, or some oint-
ment of the same kind, plain or diluted. But
as soon as the inflammation of the ulcer and the
surrounding parts has been relieved, you may
begin the application of pressure. The pressure of
a common roller will do a great deal of good, and
formerly nothing else was recommended. But we
find, now, that in cases of varicose ulcer, as in cases
of indolent ulcer of the leg, you may very much
assist the common roller by the addition of other
means. One very good way of making pressure
on a varicose ulcer is to interpose between it and
the bandage a piece of sheet lead, such as is used
in anatomical museums for covering preparations.
The lead should be made quite smooth, and larger
than the ulcer, so as to extend beyond its
margin. This makes a very uniform pressure, and
really does very well. But, for the most part, we
are in the habit of using pressure by means of
plaster applied in a circular manner round the
limb. It is common to employ stripes of linen
spread with soap or adhesive plaster; but on the
whole the diachylon plaster is to be preferred, for
both soap plaster and adhesive plaster will at
times irritate the skin, and bring on inflammation
and pustules, while diachylon plaster scarcely ever
produces this effect. In some cases it is desirable
to employ only a very moderate degree of pressure
in the first instance; and on these occasions you
will find a mixture, of one part of spermaceti
cerate to three parts of the diachylon, to answer
the intended purpose. It may be spread on calico,
cut in stripes, and applied in the usual manner.

You have an opportunity of seeing stripes of diachylon plaster applied over and over again every day in the wards of the hospital; and, therefore, it might seem almost superfluous for me to make any observations on the mode of applying them. Still as I find that new dressers very seldom apply them in the manner that I believe to be most useful, I shall offer to you some observations on the subject, which may, at all events, be useful to the junior students.

The stripes, previously warmed, should be applied round the limb, the two ends crossing each other in front, the application beginning below the ulcer, and extending some way above it. Each of the stripes ought to overlap the one below by one half of its diameter. Thus every part has a double piece of plaster over it, and you secure more equal pressure than you could otherwise obtain. It is of great consequence that the plaster should be tight enough to give comfortable support to the limb, and at the same time not so tight as to make the limb swell below; for if it should produce this effect, it is very likely that it will bring on a sloughing of the sore. The plasters ought to make uniform pressure; that is, the pressure should be equal throughout; or if there be any difference in the degree of pressure, it ought to be greater below than above. If you do not attend to this point, the plaster above operates as a tight garter, and does harm instead of good to the lower part of the ulcer.

When you apply the plaster, it should always be with the heel raised, the patient lying flat on

his back, so that the vessels of the leg may be emptied of their blood. If the leg be hanging down at the time of the plaster being applied, the veins are full of blood, and the plaster becomes loose as soon as the foot is raised.

The plaster, if there be much discharge, should be changed daily; but as the discharge becomes less in quantity, it may be changed every other day, or once in three days, and in some cases even less frequently than this.

Frequently, in cases of varicose ulcer, the veins on each side of the leg, just above the heel and behind the ancles, are formed into a varicose cluster. A bandage applied in the common manner does not sufficiently support these veins. The ulcer may be above, and you may cover it with a bandage; but if there be such veins, as I have mentioned, below, you must not, for obvious reasons, leave them uncovered. In this case some stripes of plaster should be applied round the lower part of the heel, extending upwards in a longitudinal direction on each side of the leg, and secured by circular stripes placed over them at the upper part. In the application of the bandage, you ought to pursue the same course: a longitudinal bandage, extending under the heel and up each side of the leg, should be applied first, and the circular bandage afterwards. These may appear matters of little importance, but a great deal of your success in practice, not only in these but in other cases, will depend on attention to such minutiæ. It is not enough to understand the nature of a disease, to make a good diagnosis, and

to know what remedies are to be employed; you should also take pains to apply these remedies in the best possible manner, otherwise they may fail in producing their effect. In some cases of varicose ulcer you will promote the healing of the ulcer by touching it every other day with a strong solution of nitrate of silver in water, beginning with five or six grains to an ounce, and increasing the strength gradually. But I do not advise you, as a general rule, to make any application in the way of dressing under the plaster. I find a young dresser frequently interposing a piece of lint, with or without simple ointment, between the plaster and the sore. It is a very injurious practice; it keeps the sore slopped with its own discharge; and it prevents the plaster from making that uniform and regular pressure which is required. When the sore is healed, the patient should continue to wear the plaster for *some time* afterwards, otherwise the cicatrix will give way; and for the same reason he should *ever* afterwards wear the bandage.

Other methods of treating patients labouring under varicose veins have been proposed by surgeons in former times, and also of late years. I need not carry you back to the practice of Celsus in these cases, nor even to that of Heister. I shall only speak to you of methods that have been suggested within the last thirty or forty years.

Sir Everard Home recommended the application of a ligature, where the veins of the leg were varicose, to the *vena saphena major*. He performed this operation in a great number of cases, and in a

few cases he applied it to the *vena saphena minor.*
When I was a student, nothing was more common
than to see a patient with varicose veins standing
on a table, and leaning over the back of a chair,
for the purpose of undergoing the operation.   The
skin was divided ; a silver needle, with a ligature,
was passed under the vein, and the vein was tied.
In many instances, at first, no ill consequences
ensued ; but by and by a private patient of Sir
Everard Home became affected with venous inflam-
mation, and died.   The same thing then occurred
in another patient.   When I was house-surgeon
here, there were two women on whom the opera-
tion was performed, in each of whom venous
inflammation, attended by typhoid symptoms,
supervened.   Fortunately they did not die, but
they certainly had a very narrow escape.   The
operation was performed by other surgeons, and
in their hands also it was found that every now
and then venous inflammation was induced, which
ended fatally ; and it was then very generally
abandoned. Mr. Abernethy remarked :—" I dare
" say it is only the ligature that brings on the
" inflammation. You divide veins when you am-
" putate, and they do not become inflamed ; why
" should you not merely cut across the *vena
" saphena,* and put on pressure ? "   He was mis-
taken in his view of the subject, which was not
indeed much understood by surgeons at that time.
We now know that veins after amputation not
unfrequently inflame, and that this is one of the
causes of death after amputation.   When I was
first assistant-surgeon, there was a man with very

bad varicose veins; such a case as those in which the *vena saphena* would formerly have been tied. I did not tie it, however; but I followed Mr. Abernethy's advice, cutting it across, and applying a compress and bandage. The patient had venous inflammation, attended with very severe typhoid symptoms, and died within four days after the operation. Since then, as you may suppose, no operation has been performed on the *vena saphena*, either by ligature or in any other way. There are indeed no circumstances here to justify the performance of a dangerous operation. You may perform such operations to get rid of a disease still more dangerous, but you have no right to perform an operation attended with such a degree of danger as can be appreciated, in order to get rid of a disease which is not dangerous; and no one can say that varicose veins belong to the class of dangerous diseases. But still there is another reason against having recourse to this operation. I do not believe, from what I have formerly seen, that it permanently benefits the patients. It is true that they appeared to go out of the hospital much relieved; but where I had the opportunity of seeing them one or two years afterwards, I always found them as bad as ever. Indeed I am by no means certain that the benefit which the patients appeared to derive, in the first instance, was the result of the operation; and I am more inclined to believe that it arose from their having been necessarily kept for some time in bed in the horizontal posture. Patients with varicose veins always seem to improve under these circum-

stances. But I may observe further, that there appears to be no reason why, in ordinary cases of varicose veins, the obliteration of the *saphena* should do any good, and that there are better grounds for believing that it will do harm. I have already explained to you that pressure on large venous trunks causes an obstruction of the blood in passing through them, and that this is one common cause of varices. In *very bad cases*, however, of the disease, I can understand why the patient should derive benefit from the ligature of the principal vein. To explain this, I must first call your attention to the different condition of the parts where the veins are very much dilated, and where the disease has proceeded only to a limited extent.

If the veins are but little dilated, or dilated only in particular places, the valves will still continue to answer the purpose for which they are designed. If the *vena saphena* be not at all dilated, while the smaller veins of the leg are dilated, the valves of the *vena saphena* act perfectly, and take off the weight of the column of blood pressing on the veins below; but if the *vena saphena* be itself considerably dilated, its valves are of course rendered inefficient. Now observe the result of this. I had a patient in whom there was an unusually large cluster of varicose veins on the inside of the leg, while the *vena saphena major* was of enormous diameter, so that the valves were evidently good for nothing. If I put on a bandage, and squeezed the blood out of the veins below, and then put my thumb on the *vena saphena* above, so as to

stop the circulation through it, I found, on taking off the bandage, the patient being in the erect posture, that the cluster of veins below filled very slowly, and only from the capillary vessels. But if, the patient being in the erect posture, I removed the pressure from the vein, the valves being of no use, the blood rushed downwards by its own weight, contrary to the course of the circulation, and filled the varicose cluster below almost instantaneously. I can understand that a ligature upon the *vena saphena* under these circumstances, would in a great degree lessen the inconvenience arising from the distension of the varicose veins below. It would answer the same purpose as the pressure of my thumb, but still it is not to be supposed that the good thus obtained would be permanent, or that it would be sufficient to counterbalance the chance of mischief resulting from the operation.

I was occupied, many years ago, in making experiments on the obliteration, not of the *vena saphena*, but of the varices themselves. I applied the caustic potash so as to penetrate through the skin to the veins below, and in this way I cured varicose ulcers. Mr. Mayo has, as I have been informed, employed the same practice lately, with this difference : he has applied the caustic not so as to make a slough of the vein, but so as to bring on sufficient inflammation to cause it to become obliterated. The result of my own experiments with the caustic may be told in very few words. The application of it was very painful ; the slough took a long time to separate ; the sore

took a long time to heal; and where one cluster was cured, other clusters appeared. Altogether it was a very tedious process, and my own experience does not lead me to recommend it.

Then I contrived another method. Though there is danger in cutting across large veins, or in tying them, there does not appear to be any danger which can be appreciated from the ligature of smaller veins. Piles are nothing originally but varicose veins. Now I have performed operations for internal piles, I cannot tell you how often, for there is nothing in the practice of surgery more common, and can testify that it is a very rare thing to have venous inflammation arising in consequence.

We frequently cut across small veins in operations, and they are divided by accident, but we scarcely ever find venous inflammation supervening. Although there may be danger from operations on the *vena saphena*, we have no right to expect danger from operations on its smaller branches. My plan was as follows. Supposing that I intended to cure a particular cluster of veins, I used a sharp-pointed and very narrow bistoury, which cuts, not like a common bistoury, on the concave, but on the convex edge. I punctured the skin with this instrument on one side of the varicose cluster; carried the blade under the skin, between it and the varicose veins, over to the other side; and having carefully performed this part of the operation, the skin remaining entire, except where the first puncture was made, I turned the edge of the instrument backwards, and, drawing it out, cut across the varicose

cluster. A good deal of hæmorrhage follows, but the pressure of a compress at once commanded it, and a bandage was applied afterwards. The wound, in most instances, healed by the first intention. The varicose veins were obliterated, and usually in a few days the patient suffered no inconvenience from the operation. However, in some cases, the wound suppurated, instead of healing by the first intention, which protracted the cure. In some instances in which I had recourse to this operation, a remarkable occurrence took place. Although I was satisfied that the cluster was divided, the disease was not cured. It seemed as if the veins healed without becoming obliterated. As the *ductus choledochus*, or the intestinal canal, will heal after the application of a ligature, without the continuity of the canal being destroyed, so it appears to be with divided veins under certain circumstances.

I published in the Medico-Chirurgical Transactions an account of this operation, in the year 1817, and I believe that it affords the first example of the subcutaneous operation, which is now so successfully employed in other cases. As applied to varicose veins the operation is as easy and as safe as it is on other occasions, yet I scarcely ever have recourse to it now. With my present experience, it really appears to me that in ordinary cases it is not worth the patient's while to submit to it, as I always observed that, if I cured one cluster, two smaller ones appeared, one on each side, and that, ultimately, I left the patient no better than I found him.

The operation, however, is proper where there is a varicose cluster much distended, and liable to burst and bleed. Here you may actually save the patient's life by having recourse to it; and you may do so without considering whether fresh clusters are or are not likely to form afterwards. Sometimes, when there is a varicose cluster above or below, on which a varicose ulcer depends, you cause the ulcer to heal, sooner than it otherwise would, by dividing the cluster. In such cases I observe that it generally heals sooner if you divide the cluster below, than if you divide the cluster above. Then there are some cases where a varicose cluster is productive of an unusual quantity of pain, apparently in consequence of there being a nervous filament lying over it which is kept on the stretch. And here you may relieve the patient from the pain of this particular varix by the division of it. But these occasions are of rare occurrence; and under other circumstances I repeat that it is not worth the while of any patient to submit to the operation.

I ought not to take leave of the subject which is before us, without referring to a very ingenious method of obliterating varicose veins, which has been lately adopted by M. Velpeau, of Paris. He introduces a pin or needle through the skin, which is passed underneath the vein, and at right angles to it. A twisted suture is then applied round the two ends of the pin, so as to compress the vein sufficiently to produce its obliteration. I cannot, from my own experience of this practice, say any thing of its advantages or disadvantages; but

I must acknowledge that it seems not improbable that it may be preferable to the other methods of which I have given you a description. Still, the observations which I have made as to the other methods apply equally to this. It may be useful in certain cases, and under peculiar circumstances; but I can see no reason to believe that you would be justified in having recourse to it on ordinary occasions.

LECTURE X.

ON THE CASES OF SCIRRHOUS TUMORS OF THE BREAST WHICH REQUIRE AN OPERATION.

IF a scirrhous tumor of the female breast be left to take its own course it gradually increases in extent; it contaminates the neighbouring textures; it finally ulcerates, and in the greater number of cases the patient's life is terminated in three or four years from the commencement of the disease. Not only is life terminated thus early, but death is preceded by a most painful state of the ulcer. It is disposed to bleed and to slough, and the patient is rendered miserable. There is not a much worse way of going out of the world than that of being destroyed by this disease.

Looking at these facts alone, you would say that there is no doubt that the proper thing to do is to remove the tumor by an operation. But then there is another order of facts to be taken into account. We find that in the larger proportion of cases in which the operation is performed, the patient is not alive two or three years afterwards; and in a great many cases, instead of the operation stopping the disease, it actually seems to hasten its progress. We find, besides, that the operation in itself is not in all cases free from danger.

These different orders of facts have led different surgeons, accordingly as they have looked at one or the other of them, to come to different conclusions as to the propriety of the operation.   The late Mr. Cline, for example, and Sir Everard Home, both men of great experience and sound judgment, would scarcely ever consent to the removal of a scirrhous tumor of the breast under any circumstances; whereas I have known other very experienced surgeons who were in favour of an operation, even in the great majority of cases. And not only has there been this difference of opinion between different individuals, but I have known the opinion of the same individual to differ at different periods.   I remember a surgeon, whom I esteem as a great master of his art, saying that he had almost determined that he would never perform this operation again; and yet that very surgeon, some three years afterwards, recommended the operation in a case in which I thought that it would fail.   This discordance of opinion only shows the difficulty of the subject; and if this difficulty has stood in the way of men of great experience, it may well stand in the way of you who are beginning your career.   Hence, it appears to me that it may be of advantage to you if I offer some observations on the subject, and endeavour, as far as I can, to clear away the doubts which may arise in your minds as to the expediency or the inexpediency of the operation.

This, then, is the subject of the present lecture :—Under what circumstances is the operation for the removal of a scirrhous tumor of the breast

proper, and under what circumstances is it improper?

I should observe here, in the first instance, that while a great deal depends upon the nature of the case, something will depend upon yourselves, and upon the mode of performing the operation. If there be a scirrhous tumor imbedded in the gland of the breast, and you remove the tumor and a piece of the breast in which it is imbedded, and leave the rest of the breast, according to my experience the disease will certainly return; and this corresponds to a rule which applies to all cases of malignant disease,—that you have no security from an operation for its removal, unless you remove the whole of the organ in which the disease is seated. If, for instance, there be *fungus hæmatodes* of the bone of the leg, the patient may have some chance of doing well if you amputate the thigh above the knee; while, if there be malignant disease of the femur, he has almost no chance, unless, indeed, you think it worth while to take out the bone at the hip-joint. I say, therefore, that in cases of scirrhous tumor of the breast, where the tumor is actually imbedded in the breast, if you perform the operation you must remove the whole of the breast. You may imagine that this is a very easy thing to be done, but it is not so easy in reality; for in amputating the breast, you will be very apt, in a thin person, if you are not very careful, to leave small slices of the gland of the breast adhering to the skin, and I have no doubt that the part or parts thus left behind in some cases have formed the nidus

of future disease.   The colour of the gland of the breast is very little different from that of the surrounding adeps ; and the blood that flows adds to the difficulty of distinguishing between them. To avoid this error, you must be careful in the dissection to keep the knife near the skin, not near the breast ; and, further than this, in every case when you have removed the breast, you should look at its surface, and see that it is every where covered by healthy adeps.   If it be not, then examine the inside of the flap of the skin, and see whether any small portion of the breast has been allowed to remain there.

So far, I say, the success of the operation may depend mainly on yourselves ; but now let us consider what are the circumstances, independently of any thing that you do, that may lead you to think there is no chance of the operation leading to an ultimate cure : and what are the circumstances that would lead you to hope that the result may be more favourable ?

You may divide scirrhous tumors of the breast into two classes : one where there is a conversion of the gland of the breast itself into the scirrhous structure, there being no well-defined margin to it ; the other, where there is a scirrhous tumor imbedded in what appears to be otherwise a healthy breast, as if it were altogether a new growth, there being a well-defined boundary to it.

In the first order of cases, where the tumor has no distinct boundary, and where there is a conversion of the gland of the breast into the diseased structure, the operation not only never succeeds

in making a permanent cure, but it rather hastens
the progress of the disease. The patient dies
within two or three years, and probably much
sooner, from an effusion of fluid into the cavity of
the pleura.

In another order of cases, where the skin is
contaminated, there is no chance of the operation
making an ultimate or permanent cure. The skin
may be contaminated in different ways. Scirrhous
tubercles sometimes form in it here and there at
some distance round the tumor, the intermediate
portions of the skin appearing to be healthy.
Here an operation will never lead to a cure, for
experience shows that you can never remove the
whole of the contaminated skin. The line of
the incision may be quite beyond the tubercles
which have already shown themselves; but other
tubercles will show themselves afterwards. In
these cases, whether an operation be had recourse
to or not, the progress of the disease is always
very rapid, the immediate cause of death being in
the majority of them an effusion of serum into the
chest.

But the skin is often contaminated in another
manner. It is thickened and brawny, the pores
seem enlarged, as if you were looking at them
through a magnifying glass, and you cannot pinch
it up between your fingers as you can healthy skin.
This is a very bad form of scirrhus. I have
know the operation performed in two or three such
cases, and the disease has always immediately
returned in the cicatrix, the operation appearing to
hasten rather than to retard the fatal result. It

does not matter how small an extent of skin appears to be thus contaminated; if any portion of it be in this state, the seeds of the disease are in the skin in the neighbourhood, and the knife divides what is apparently healthy but what is not healthy in reality.

A scirrhous tumor of the breast not unfrequently causes a contraction of the lactiferous tubes which pass from the various parts of the breast to the nipple; and this contraction necessarily causes a drawing in or retraction of the nipple. The retraction of the nipple is to be regarded as an unfavourable symptom. There is danger of the disease having extended from the nipple to the skin in the neighbourhood; and an operation ought not to be had recourse to, until by a careful examination it has been ascertained that the skin does not appear to be otherwise than in a healthy state.

In many cases of scirrhous tumors of the breast, the skin is drawn, or tucked, in, over the tumor, so as to produce the appearance of a dimple in it. Where this dimple in the skin exists you may be almost sure that there is a scirrhous tumor in the breast beneath it, and on examination you will feel it with the finger. I believe this dimple of the skin to form a very great objection to the operation, and that, under these circumstances, there is little or no chance of it leading to a permanent cure. But on what does this appearance depend? In a case which I dissected very carefully I found a narrow process or elongation of the disease, perhaps half an inch in length, passing from the tumor through the adeps into the skin, and con-

necting the skin and the tumor to each other.   In
fact the dimple indicates that the disease is not
confined to the breast, but that the skin is already
contaminated.

Then, as the disease goes on, it contaminates the
glands in the axilla.   The glands in the axilla,
if the breast be inflamed, may be inflamed and
enlarged as glands may be inflamed and enlarged
from a boil or other inflammation in the neighbour-
hood.   But when there are indurated glands of the
axilla, independently of inflammation, you may be
sure that there is the same disease in them that
there is in the breast, and that no ultimate cure is
to be expected.

You may say, " But why not remove the
diseased glands from the axilla?" I have done
this, and seen it done, and I will tell you what
invariably happens. Perhaps you have discovered
only one enlarged gland in the axilla ; you have
determined to remove it; but when you have made
an incision into the axilla, you find other glands
affected in the same manner, though of too small
a size to have been perceptible through the skin
before the incision was made.

I need scarcely tell you, that if the scirrhous
tumor adhere to the parts below, that is, to the
pectoral muscle or ribs, or if the skin be ulcerated,
there is no chance of a permanent cure from the
operation.   You will find patients sometimes, who,
while they have a scirrhous tumor in the breast,
have indications of the same, or some other, form
of malignant disease, in other organs.   In one
you have reason to believe that there is malignant

disease of the liver; in another of the lungs; in another of the uterus. Of course, if there be any suspicion of the same mischief going on elsewhere, you will know that no permanent cure is to be expected from the removal of the diseased breast.

These circumstances then are sufficient to forbid an operation with a view to an ultimate cure. But you must also take into account the age of the patient, and condition in other respects. For instance, if an old woman has a scirrhous breast in a quiet state, you would never think of amputating it, because she may die before there is an alteration for the worse. The disease may outlast her.

Now, having taken away these cases, you will find in practice that there are very few left in which you will think it right to propose an operation, as affording a chance of permanent cure. What are the cases, then, in which the removal of the breast is proper? Where on a careful examination no appearance of disease can be detected in the skin; where there is no dimple in the skin over the tumor; where there is no diseased gland in the axilla; where there is no sign of internal mischief; where there is no adhesion of the breast to the parts below; and where the patient is not very much advanced in life;—in a case where this fortunate combination of circumstances exists, we may presume that there is a reasonable chance of an operation being successful.

Still, I must not be misunderstood as saying that in every one of such cases there will be a

permanent cure ; nor do I say more than this, that
the chance of a cure is sufficient to warrant you in
recommending the patient to submit to an opera-
tion ; and that I have the satisfaction of knowing
several persons on whom I have performed the
operation under these circumstances, who are now
alive and well, and who otherwise would certainly
have been dead long ago.   So long since as
1832, I removed a breast affected with a scirrhous
tumor, and the lady is still in good health,—at
least she was so last year.   Since the operation
she has married and had children.   Last year I
was called to see a lady on account of another
complaint, on whom I performed the operation
thirteen years ago, and found that she continued
free from the old disease ; and very lately I have
heard of another lady whose scirrhous breast I
removed six years ago, and who continues well.

But besides such cases as these which I have
just described, there are others in which the
operation for a scirrhous tumor connected with
the breast may be performed with a still better
prospect of success.   A hard tumor sometimes
forms on the surface of the breast, which feels like
scirrhus, and on cutting into it, it looks like it ;
so that I can give the disease no other name.   It
appears to be unconnected with the breast ; but
when you remove it, you find that it is attached
to the surface of the gland, just at one narrow
corner.   I have removed three tumors of this
kind, leaving the breast untouched, except where I
separated the tumor from it ; and in each of these
three cases I learned that the patient continued

well a considerable time afterwards. Indeed, I do not know that in any one of them there has been a return of the disease.

Again, a scirrhous tumor may occur in the nipple; and I believe that this may properly be distinguished from a scirrhous tumor of the breast itself, and that there is a greater chance of a permanent cure from an operation where the disease originates in the nipple, than where it originates in the breast. There was a lady who had such a tumor of the nipple. She consulted several surgeons about it; and as the disease was in a quiet state, it was recommended that it should be let alone. After some time she came to London, and was under the care of the late Mr. Rose, who was a surgeon of this hospital; and I saw her with him. The tumor was still confined to the nipple, and had been going on for some years without coming to any harm; but it was now making progress. The result of the consultation was that Mr. Rose removed the breast, which appeared sound, the disease being confined to the nipple, and its immediate vicinity. She recovered, and I have reason to believe that the cure was permanent. Another lady consulted me concerning a scirrhous tumor of the nipple; for so I call it, as it was of a stony hardness, and presented the usual characters of that disease. The tumor was in a state of ulceration. She was a stout elderly lady, with an enormous breast, and a great deal of adeps over it. The removal of the whole breast would have been a frightful operation, and it is probable that her constitution

would have sunk under it. I applied the chloride
of zinc, and afterwards the caustic potash, till I
destroyed what appeared to be the whole of the
disease. This was three or four years ago. The
wound healed, and the patient is well at this
moment. The two last orders of cases are, then,
to be especially distinguished from those of which
I have spoken formerly.

But here another question arises, Is there no
other reason for performing the operation for the
removal of a scirrhous tumor of the breast, than
the hope of making a permanent cure? May it
not be worth while to resort to it sometimes, merely
with a view to give the patient a respite; to
relieve her from present suffering, or with a view
to prolong life for a limited period? Undoubtedly
it is; and I will mention to you some cases illus-
trative of this observation. There was a lady
about 40 years of age, who had a scirrhous tumor
of the breast, and there was a cluster of diseased
glands in the axilla. When she came to me the
skin over the tumor appeared to be on the point
of ulceration, so that the disease was going on to
great mischief. I said to her, " I do not believe
" that the operation will make a cure, and I can-
" not recommend it." She asked whether I had
any thing better to offer; and I could not say that
I had. She went away, but in two or three weeks
came again. She then said that she had consulted
two or three other surgeons (whose names she
mentioned), and found that they were all of the
same opinion. But she added, " I now come to
" beg a favour of you; and that is, that in spite

" of these opinions you will remove the breast."
I asked what her reasons were, and she said,
" I am in these circumstances : I have a daughter
" 18 years of age, an only child. I know that I
" shall not survive very long ; but it is a great
" object to my daughter that I should live to be
" her friend and adviser for two years longer.   It
" is for this reason, and this only, that I wish to
" take the chance of an operation."   There was no
withstanding such an appeal as this, and I removed
the breast, but without interfering with the glands
in the axilla.   There was no distinct return
of the disease in the cicatrix, and the glands in the
axilla did not greatly enlarge ; but at the end of
two years she was seized with symptoms of disease
in the chest ; there was an effusion of fluid into the
pleuræ ; and she died. (I may take this oppor-
tunity of mentioning that this is the most common
way in which scirrhous tumors terminate life.
Very small scirrhous tubercles form in the lungs,
and these are followed by an effusion of fluid into
one or both of the pleuræ.)   There was a lady
who applied to me with a scirrhous tumor of the
breast.   It was small, and so also was the breast ;
and I should have recommended the operation,
but that there were two or three hard and large
glands in the axilla.   I said to her, "You have
" not much suffering ; I cannot recommend an
" operation ; let it alone." A year after, she came
to London again.   The tumor had now ulcerated,
the glands had much increased, the ulcer pro-
duced excessive suffering, which made her life
miserable.   I did not remove the tumor with the

knife, but I applied the chloride of zinc, and destroyed it thus. The sore healed. Some seven or eight months afterwards a tubercle had formed in the cicatrix, which ulcerated like the former one, and I destroyed this in the same manner. She was enabled to go on with great comfort, in fact suffering but very little, except at the time when the chloride of zinc was applied. At last, after the lapse of a year and a half, disease was established in the lungs, effusion took place into the pleuræ, and in this manner she died. There was a lady who had a large malignant tumor of the breast; it was not exactly scirrhous, but approaching to it in its character; and I did not think that an operation would lead to a permanent cure. By and by she consulted me again, and now the tumor was very much enlarged. The skin was ulcerated, and the ulcer was horribly painful, so that her life was truly wretched. I said, " I am afraid you will not get " a permanent cure; but, suffering as you are, it " is worth your while to have the breast removed, " with a view to your being relieved from your " present misery." The breast was accordingly amputated. It was of a very large size, and there was a very broad wound, with a great deal of bleeding; but she recovered, and continued well upwards of three years. She had then some abdominal disease, and a tumor was felt in the belly, which I conclude was of the same character as the one in the breast. She fell a victim to this secondary disease, but I have the satisfaction of knowing that she was relieved of great suffering, and lived three years

longer than she would have lived if the operation had not been performed.

I may mention other cases. A lady came to London, with a large tumor in one breast. There was a fungus protruding, and in the centre of the fungus there was an opening, through which a probe could be passed to the bottom of the tumor. There was also an enlarged gland in the axilla. Sir Astley Cooper saw the patient with me; and as she was suffering dreadfully from the ulcerated tumor, we agreed that she should have the breast removed, not expecting a permanent cure, but merely that she might obtain relief from her present distress. The operation was performed; the wound healed, and she had no return of disease in the breast; but a year afterwards her physician in the country wrote to me, saying that she had symptoms of some malignant disease going on in the chest. She died of effusion into the pleuræ. There was another lady with an ulcerated scirrhous tumor of the breast, which was so painful as to make her life miserable. I told her that I could not promise her a permanent cure; but as she was suffering so severely, she might as well have the tumor removed, nevertheless. She did so, and she lived in comfort for many months.

There may be, then, circumstances which justify you in performing the operation for the removal of a scirrhous tumor of the breast, not in the expectation of a permanent cure, but with the view to afford the patient a respite and relief from present suffering. Of course you are here called upon to exercise no small degree of discrimination;

and especially you should reject altogether those cases in which the skin is distinctly contaminated by the disease, whether it be that there are scirrhous tubercles in it, or that it be converted into the brawny structure which I have formerly described. In neither of these cases will the patient obtain even a respite by submitting to an operation.

There is still another circumstance to be taken into the account, when you are required to give an opinion as to the expediency or inexpediency of an operation. Is there any danger in the operation itself? It is commonly said, that this is not a dangerous operation; but I can appeal to the experience of all surgeons who have had much to do with it, whether it be always free from danger. I know that it is not. I have myself lost patients after the operation; and I have never known any one much employed in operative surgery who has not had the same misfortune. Here, I think that something depends upon the mode in which you perform the operation, and manage the patient, both before and afterwards; while a great deal depends upon circumstances not under your control. Especially, you should take care that there is as little hæmorrhage as possible at the time of the operation. Never believe those who, standing by at an operation, say, "The patient has lost no more blood than will do him good." Hæmorrhage, during any operation, is a great evil; and is one of the chief causes of failure. It is not that the patient dies directly of hæmorrhage, but that he may do so indirectly. It lays the foundation of erysipelas, and of venous inflammation, and

other mischief, some time afterwards.   Then take care not to keep the patient very low before the operation.   What used to be termed preparing for an operation by low diet is always wrong.   The patient need not to be stuffed and crammed with food before an operation, and she should have her bowels emptied ; but as to repeated purging, and very low diet, that is not right, either before an operation or after it.   An operation is a shock to the system, making a great demand upon the vital powers ; and if you take away whatever stimulus and food the patient is accustomed to, the constitution, probably, will not bear it.   So far, I say, the success of the operation is, to a certain extent, under your control ; but there are also unfavourable circumstances which you cannot influence. For instance, in a large fat woman, with an enormous breast, the operation is frightful.   There is an immense wound, and there will probably be great hæmorrhage in spite of all your care.   An old woman will not support the operation like a person less advanced in life.   You are to look upon an operation, especially if there be a large incision, in an elderly person, as always attended with a certain degree of danger ; and so it is when the patient is of a delicate and fragile constitution. For example, those women whom you meet with frequently in private practice, with an hysterical nervous system, a small pulse, and cold hands and feet, are always unfavourable subjects for operations, especially for those that are attended with even a moderate loss of blood.   In such women as these you are to avoid an operation, if possible.

But where the breast is small; where the patient is otherwise healthy, and not much advanced in life; and where you do not starve the patient, either before the operation or after it; and are also careful that there shall be as little loss of blood as possible;—there the danger of the operation is comparatively trifling.

I have hitherto spoken of the operation for the removal of scirrhous tumors of the breast; but the breast is liable to other malignant diseases, and the observations which I have just made apply to these cases as well as to the others. I think, however, that where the malignant disease of the breast has the form of *fungus hæmatodes*, the chance of ultimate success is even less than where the disease has the form of scirrhus. *Fungus hæmatodes* is a worse form of malignant disease than scirrhus; and in most of the cases of it which I have seen in the breast, where the tumor has been removed by operation, the patient has died in a short time afterwards of disease of the lungs and effusion into the pleuræ. But, after all, I believe that the disease is essentially the same, whether it assume the form of scirrhus, or fungus hæmatodes, or pancreatic sarcoma. Whatever may be the names given to them by pathologists, you may be assured that malignant diseases are all nearly related to each other; and that the remarks which are applicable to one are very generally applicable to the rest.

As we have sufficient time before us, I shall take the opportunity of mentioning some cases in illustration of this last observation, which I think

it is of importance in practice that you should not forget. There was a woman who had a scirrhous tumor of the breast; there was that brawny condition of the skin, which I have already described as indicating a very bad form of the disease. The whole of the skin had assumed the scirrhous structure, so that the tumor of the breast was scarcely to be distinguished under it. She had also some disease of the liver, and there was a discharge from the uterus. She died; and on examining the breast, there was found a well-marked scirrhous tumor in it; but in the liver there was a tumor, having equally well-marked characters of fungus hæmatodes or medullary disease; and in the uterus there was an excrescence of that kind which the late Dr. John Clarke described as the " cauliflower excrescence;" and which he regarded as an incurable malignant disease of that organ. So that these three diseases, all malignant, and to which different names have been given by pathologists, were all associated in the same individual. You will see the appearances which they presented sufficiently well preserved in the preparations on the table.

On other occasions you will find malignant diseases, to which different names are given, occuring in succession.

When I was a young man, I went with Sir Everard Home, to assist him in a private operation in the case of a lady from the country, who had a tumor apparently in the abdominal muscles. Sir Everard removed the tumor; and when we came home, and examined it, we found that a portion of

peritonæum adhered to it, and that it was of a distinct scirrhous structure. The wound healed very well, and the patient went out of town. In the course of a little time, however, she returned to London, with another tumor formed in the cicatrix. She again put herself under Sir Everard Home. The tumor was larger than the one originally removed; but there seemed to be nothing else to be done, and he removed this also. It had no longer the characteristic structure of scirrhus; and I can only describe it by saying that it was like the fibrine of the blood, without the red colour; laminated; bearing some resemblance in its appearance to the buffy surface of a coagulum of blood drawn during inflammation, and very slightly organized. The wound healed; but by and by a third tumor formed in the cicatrix, and she again came to London. It seemed not worth while to remove the tumor a third time. It increased in size, and occupied a great part of the abdomen. She died; and it fell to my lot to examine the body. The morbid growth was entirely different in appearance from either of those that had been removed. It was a regular brain-like or medullary mass; in fact fungus hæmatodes.

There is a circumstance which I ought to have mentioned in an earlier part of the lecture, and which should always be taken into account whenever you are in doubt as to the expediency of the operation. It is very true that a scirrhous tumor of the breast will generally terminate the patient's

life, if left to itself, in three or four years; nevertheless, it often lasts much longer. I remember a lady of fashion, who had a scirrhous disease of the breast; who lived in the world, and nobody knew any thing about it for several years,—I believe ten or fifteen. I remember another lady who had a scirrhous tumor of the breast twenty-five years; and she died at last, not from the disease of the breast, but from effusion into the cavity of the chest. If you are doubting about the expediency of an operation, and the disease be in an indolent state, the recollection of such cases as these, where the patient has lived with a scirrhous tumor of the breast unaltered for many years, should be sufficient to incline you to reject it. The chance of a patient living long with such a disease is not such as should induce you to throw away the chance of an operation, where it is likely to be attended with advantage, but is sufficient to make you decline the having recourse to it, where other circumstances would lead you to doubt its propriety.

LECTURE XI.

ON CORNS AND BUNIONS.

It cannot be doubted that the physical condition of man is on the whole much improved by civilization. The increased length of human life sufficiently proves the fact. But it is not all gain; and the usages of society are productive of some evil, combined with much good. The evil affects the weaker more than it does the stronger sex. Young ladies, living much in heated rooms, taking little exercise in the fresh air, over-educated as to the acquirement of accomplishments, and using their muscles too little, lose the beautiful figure with which they are endowed by nature, and become affected with the various kinds of curvature of the spine, and weakness and distortion of the ankles. The same mode of life renders them liable to the innumerable varieties of hysterical disease, which in so many instances destroy the comfort, and I may say the dignity, of existence, enervating both the body and the mind, and making their condition altogether much less desirable than that of the poor peasant girl.

There is another order of diseases which we meet with more frequently among females of what are called the better classes than among other persons; namely, corns and bunions; and it is to

this last humble, but not unimportant, subject, that I propose to call your attention in the present lecture.

A corn is in the first instance a thickening of the cuticle. Whenever the cutis is habitually subjected to the influence of pressure, it secretes a thick and horny cuticle. We find examples of this in the hands of many mechanics, and in the soles of the feet in those who walk much. But every thickening of the cuticle is not a corn, and this name is applicable only to those cases in which the cuticle is thickened over a projecting portion of bone, on which the pressure is, as it were, concentrated. Corns may occur in any part of the body in which this combination of circumstances exists ; but, for obvious reasons, they are met with in the feet much more commonly than any where else.

If shoes were constructed of the shape of the human foot, neither too large nor too small, and making an equal pressure every where, corns and bunions of the feet would never exist. But, unfortunately, shoes are seldom made after this fashion, and in ladies' shoes especially there are generally two signal defects : first, the extremity of the shoe is much too narrow for that part of the foot (namely, the toes,) which it is to contain ; and, secondly, for the purpose of displaying as much of the foot as possible, the whole of the tarsus and metatarsus is left uncovered, and the pressure of the shoe in front is thrown entirely upon the toes. The toes are thus first squeezed against each other, and then pushed out of their natural position ; and all the

projecting points, chiefly where the joints are
situated, are pinched and tormented either by the
neighbouring toes or by the leather of the shoe,
and thus it is that corns of the feet are generated.

In order that you should understand the precise
situations in which corns are most likely to take
place, you must consider more particularly the
effects which the pressure of the shoe produces on
the toes. The little toe is pushed from its parallel
position, so that it is in fact underneath the fourth
or adjoining toe, and corns are generated on its
outer surface over the prominences of its joints.
A corn is also frequently met with in the angle
between the little toe and the next toe, where the
first phalanx of the former is pressed against the
head of the metatarsal bone supporting the latter.
Sometimes the consequence of wearing a very
narrow shoe is, that one of the toes (and it is
generally the second or fore-toe) is pushed up-
wards, so that it lies over the two adjoining toes,
that is, over the great toe and the third toe, the
extremities of which come in contact underneath ;
then the leather of the shoe being drawn tight
over the upper surface of the second or displaced
toe, corns are produced over one or more of its
articulations. At other times one of the toes (and
in this case also it is generally the second toe) is
displaced in another way. The extremity of it is
pushed downwards, so that it lies beneath the
extremities of the two adjoining toes, which come
in contact over it. But this change cannot take
place while the three phalanges of the displaced
toe remain in a line with each other. The first

and second phalanx make an angle, projecting upwards. The second joint of the toe becomes prominent above, and a corn is formed over it. If the shoe, instead of being too narrow, be too short for the foot which it contains, the last phalanges of all the smaller toes are kept constantly in a half-bent state, and a row of corns is generated, one being situated on the upper part of the last joint of each of these toes. I have endeavoured to enumerate what may be regarded as the most ordinary localities of corns ; but of course they may be produced any where else, according to the shape of the shoe, the mode of walking, and other circumstances.

I have said that a corn is, in the first instance, a thickening of the cuticle secreted by the cutis, when it is kept in a state of constant irritation by the operation of external pressure squeezing it against a prominent surface of a bone. But a complete corn is more than this. A bursa, or bag of synovial membrane, similar to those bursæ which are of original formation, but of a very small size, is formed between the thickened cuticle and the cutis ; and it is this combination of thickened cuticle with a subjacent bursa, which constitutes a perfect corn. This is a fact which you may easily verify for yourselves, as the opportunities of dissecting corns are abundant in the dead house of the hospital.

The thickened cuticle of those corns, which are situated externally, becomes dry, and hard, and horny ; while that of the corns which are situated between the toes remains soft, and to a certain

degree moist, and this gives rise to the distinction between hard and soft corns. I shall speak to you of hard corns first ; of soft corns afterwards.

A hard corn, when it begins to be formed, is productive of no other inconvenience than of a slight degree of pain and tenderness after much exercise. The pain and tenderness increase, so that the patient in the evening is glad to take off his leathern shoe, and put on a woollen slipper. Then the whole foot, after exercise, is hot and uneasy. These symptoms subside with rest, and the absence of pressure, during the night, but return with the wearing of the shoe and exercise during the day. By and by the bursa under the horny cuticle becomes inflamed, and distended with fluid, and the pain is much aggravated. But the sufferings are greatest in those cases in which the bursa suppurates. An abscess forms in parts which are incapable of distension, and you know how much mischief even a very small collection of pus, under such circumstances, may occasion. I was sent for to an old gentleman who was suffering excruciating pain in the whole foot, which was red, and much swollen, the swelling extending up the leg considerably above the ankle. In one toe, and in the neighbouring part of the foot, the tenderness and other marks of inflammation were greatest, and here I discovered an old neglected corn. He could scarcely bear the corn to be touched ; however, I carefully removed the hard cuticle with a scalpel, and made an opening into the bursa under it. Not more than a drop of matter escaped, but this was sufficient

to give immediate relief. On the following day he was well. I was desired to see another patient, a young lady, under the same circumstances, except that the symptoms were more severe. The inflammation involved nearly the whole leg, and there was a frequent pulse, and much general excitement. I removed the thickened cuticle of a corn on one of the toes, and allowed a very small quantity of pus to escape which was collected beneath it. This gave immediate relief, and on the following day she was all but well. Several similar cases have fallen under my observation.

I have already mentioned that the most common seat of a soft corn is in the angle between the little toe and the fourth toe, over the head of the metatarsal bone which supports the latter. Occasionally, however, a soft corn occurs elsewhere— as, for example, on the inside of the little toe, opposite to the last joint of the fourth toe. Such corns are even more painful than hard corns, except when suppuration takes place in the bursa, and then the suffering is less in proportion, as the thickened cuticle of a soft corn admits of distension more easily than that of a hard corn.

Under ordinary circumstances, it is easy to give temporary relief to a patient who suffers inconvenience from a hard corn. The thickened cuticle should be removed, so as to lessen the pressure on the parts below ; and this may be accomplished in various ways. *First :* If the corn be of long standing, and a piece of linen or thin leather spread with some mild plaster (diachylon for example),

be applied, and worn over it, it will sometimes exfoliate or separate without further trouble. *Secondly:* The corn may be rubbed with the nitrate of silver, or (which is indeed preferable) the concentrated nitric acid may be applied by means of a probe armed with lint. The texture of the cuticle being thus destroyed, exfoliation will take place, so that in the course of a few days the corn may be readily peeled off. *Thirdly:* The corn may be reduced in thickness by scraping its surface with a very fine steel or fish-skin rasp. And, *fourthly:* The corn may be removed by means of a fine cutting instrument. This last is the shortest and simplest method; and the patient may keep himself in a state of comfort by procuring the assistance of a dexterous chiropodist at stated periods, who will perform this operation for him better than he can perform it for himself.

With a view to a permanent cure, however, it is necessary to have recourse to other methods of treatment. In some way or other all undue pressure must be removed from the part on which the corn is situated. *First,* The shoe must be made as nearly as possible to the shape of the foot, and it must cover the metatarsus and a portion of the tarsus, so that the whole pressure may not be thrown on the toes; or a boot made to be laced or buttoned may be worn instead of a shoe. In some cases it is advisable that the shoe or boot should be made, not of ordinary leather, but of very soft and flexible buckskin, or of cloth. A material for shoes and boots is sold under the grandiloquent name of *pannus corium,* which

answers the purpose intended in these cases very
well. It is really a kind of cloth, but it has the
appearance of leather, and is very soft and pliable.
Secondly, If any of the toes are displaced in any
of the ways which I have before described, we
must endeavour to restore them to their natural
position. In young persons this may be generally
accomplished. A contrivance made use of by the
bandage-makers is very useful on these occasions.
It consists of a thin plate of metal covered with
thin leather, or a piece of strong leather, fitted to
the lower surface of the foot,—not to the whole
of the surface, but extending from the extremities
of the toes nearly to the tarsus. Slits are formed in
this plate of metal or leather, and tapes are passed
through these slits, forming loops above, by means
of which the toes are bound down and retained in
their proper places. In many cases the same
object may be attained by simpler means. A long
stripe of linen, spread with adhesive plaster, about
two thirds of an inch in breadth, may be passed
over the toes which are too much elevated, and
under the others, the extremities of the plaster
being made to cross over the metatarsus. If this
be neatly applied, it will keep the toes parallel to,
and on the same level with, each other. Which-
ever of these methods is adopted, it is necessary
that it should be persevered in for a very consider-
able time. In older persons, in whom the toes have
been long displaced, they have sometimes become
so adapted to their unnatural position, that it is
almost needless to attempt to alter it. Under
such circumstances we are sometimes, in hospital

practice, compelled to amputate one of the toes, in order that the patient may not be disabled from earning his livelihood ; and the same thing may be occasionally required in private practice. A young lady suffered from displacement and distortion of the second toe, such as I have already described. The extremity of it lay under the extremities of the two adjoining toes ; the second and third phalanges were nearly anchylosed at a right angle to each other, and a corn was formed over the second joint, where it made a considerable projection above. She applied to me to amputate this offending toe. I answered, " that I would do no " such thing ; that I might do it for a labouring " person, but that I would not do it for her, as " she had not to earn her bread by her bodily " labour." She replied, " You seem to treat the " matter very lightly, but this toe makes my life " miserable : I can take no exercise, I am unfitted " to enter into society, and I have tried all other " methods of relief without success." On inquiry I was satisfied that she in no degree exaggerated her sufferings, and I therefore complied with her wishes, and amputated the toe at the first joint.

A very simple, but scientific, method of relieving and sometimes even of curing corns, is practised by the chiropodists. A piece of buck-skin leather, spread with adhesive plaster, is applied to the toe where the corn is situated, there being a hole in the leather corresponding to the corn. Thus the pressure of the shoe is taken off the corn, and thrown on the surrounding parts. If this be kept constantly applied, and proper

shoes be worn at the same time, the corn will gradually disappear. A better material than the buck-skin for this purpose, however, is the amadou spread with soap plaster, which I have recommended on some other occasions. By laying one piece of the amadou over another it may be obtained of any thickness.

In some cases a hard corn is formed on the lower surface of the foot, over the head of one of the metatarsal bones. A corn in this situation is especially troublesome, rendering the patient absolutely lame. Some such method as that which I have just described is applicable to this case also; or an opening larger than the corn itself may be made in the upper sole of the shoe, so as to take all pressure from the corn. But here it is necessary that a thin piece of calico spread with adhesive plaster should be applied to that part of the foot in which the corn is situated. Without this contrivance, the flesh of the foot, when the patient walks, bulges or projects into the hole of the leather, and the patient's condition is rendered worse rather than better. The calico with adhesive plaster prevents this inconvenience, at the same time that it does not interfere with the intended purpose of taking the pressure off the corn and throwing it on the surrounding parts.

When an abscess is formed in the bursa under a hard corn, the treatment to be employed is very simple; although the relief which it affords is immediate and great. You are to pare off the hard and horny cuticle, and open into the bursa, so as to allow the small quantity of pus which it con-

tains (perhaps no more than a single drop) to escape. Thus, not only are the present symptoms relieved, but the corn is effectually destroyed, both the thickened cuticle and the bursa under it; and it is very easy, by means of the expedients which I have just recommended, to prevent it from being regenerated.

The treatment of soft corns is to be conducted on the same principle as that of hard ones, some modification of the treatment, however, being required, on account of their peculiar texture and situation. The thickened cuticle may be removed by the application of the strong acetic acid, or strong nitric acid, applied so as to penetrate into its substance, but not to the parts beneath. The effect of this is to destroy the texture of the corn. It becomes dry and shrivelled. In the course of a few days it begins to exfoliate, and may then be readily peeled off. If an abscess forms in the bursa of a soft corn, it should be treated in the same manner as that in the bursa of a hard one.

In some cases, even though there be no abscess underneath, a soft corn becomes exquisitely sensitive, so that the patient cannot bear it to be touched; and he is made as lame as if he suffered from the gout or any other painful malady. Such a case fell lately under my observation, which I mention, not because it was peculiar, but because the sufferings of the patient were unusually severe. There was a broad soft corn on the side of one toe, where it came in contact with the side of the adjoining toe, and not in the angle between them. The patient could scarcely walk, even with

a loose slipper, and the corn itself was so exqui-
sitely sensitive, that the slightest touch could not
be borne. This state of things had existed for
many weeks, the corn itself being of a much earlier
date. I applied the strong nitric acid until I had
reason to believe that it must have penetrated
through the thickened cuticle. An increase of pain
followed the application, and continued for some
hours. On the following day there was a manifest
improvement. I was now enabled, without any
difficulty, to remove the corn with a fine scalpel.
The recovery of the patient was immediate and
complete ; so that, having been previously quite
lame, he was enabled, in less than twenty hours, to
walk as well as ever.

The first thing to be done for the permanent
cure of a soft corn is, that the patient should be
provided with a shoe of a proper shape, and that
the toes which are in any way displaced should be
brought back into their proper position. Now I
have already observed that the most common
situation of a soft corn is between the fourth toe
and the little toe, over the head of the fourth
metatarsal bone, and that in this case the little
toe, towards its extremity, is always pushed more
or less underneath the second phalanx of its neigh-
bour. You will sometimes succeed in bringing the
little toe to its proper place by means of a stripe
of adhesive plaster, applied round it in the manner
of a loop, and then encircling the foot.

In other cases you will find the following method
more convenient than that which I have just de-
scribed :—A piece of *very thick* buck-skin leather,

spread with adhesive plaster, is to be applied on the inside of the little toe, so as to occupy the whole of the inner surface, from the apex to the second joint. The leather should be cut so as to be thin at its margin; and it should be sufficiently broad to admit of being doubled over a good part of the upper and under surface of the toe, as well as its extremity. This contrivance will keep the little toe at some distance from the next toe, and prevent it from sliding again under it. If both of these expedients fail, the patient must be content to wear for a time the metallic or leathern plate, with loops of tape for inclosing the toes, which I have already described.

The bunion, which is frequently formed on the inside of the ball (as it is called) of the great toe, differs in some respects from the disease of which I have hitherto spoken.

The great toe ought to be in a line with the metatarsal bone, by which it is supported. But a shoe which is too narrow at its extremity causes it to incline towards the outside, displacing, in a greater or less degree, the toe next to it, as I have explained already. In some cases, the effect of pressure on the great toe is actually to alter the position of the joint between it and the metatarsal bone; a portion of the articulating surface on the extremity of the latter being absorbed, and a new articulating surface being made to supply its place more externally than the old one. The existence of these changes I have ascertained by dissection.

Now, the consequence of all this is, that the head of the metatarsal bone makes an unnatural prominence, and is more acted on by the pressure of the shoe than it would be otherwise. The cuticle becomes thickened, not at one particular point, but over a considerable surface; and underneath the skin a large and very distinct bursa is generated between it and the bone. The difference between what I have now described and a common corn may reasonably be attributed to the large size of the head of the first metatarsal bone, and to the consequent diffusion of the pressure over a broad surface.

When a bunion is once formed, the bursa belonging to it is liable to become inflamed after any unusual degree of exercise, or on it being subjected to the pressure of a more than commonly tight shoe. Serum is then effused into the cavity of the bursa; the swelling is much increased, and it becomes, at the same time, exquisitely painful and tender. If the patient remains at rest, the inflammation subsides, the serum effused into the bursa becomes absorbed, and the additional swelling disappears without any further ill consequences. If, however, he continues to walk about, wearing, at the same time, a tight shoe, the inflammation proceeds further; suppuration takes place, and an abscess is formed. Such an abscess is slow in reaching the surface; the patient generally suffers severely before it bursts externally; and when it has burst, as the synovial membrane of the bursa granulates with difficulty, the healing of the abscess is very tedious, the parts

remaining all the time in a very irritable and painful state.

For the relief of this bunion, when it is free from inflammation, or inflamed only in a slight degree, the following plan of treatment should be adopted. The patient should be provided with a shoe of sufficient dimensions, of a proper shape, and made of cloth, or a soft and pliant leather. A compress should be then prepared of two or three, or more, pieces of amadou spread with soap plaster, large enough to cover the bunion and a good portion of the foot in the neighbourhood. This should be cut somewhat into the figure of a horse-shoe; and it should be then applied so that the bunion may be in the empty space, and relieved from the pressure of the shoe, which is thus thrown on the surrounding surface. The advantage of the horse-shoe-like opening, over a more circular opening, is that the soft parts do not bulge into the former as they do into the latter. If, however, the bursa be much inflamed, the patient should be confined to the couch, without a shoe. Leeches may be applied in the neighbourhood, and the parts may be fomented with hot water. If an abscess be formed, it should be freely opened with a lancet. For some time after the opening of the abscess no other treatment is required than the application of a poultice. This may be changed afterwards for soap-cerate, or zinc ointment, or other mild dressing. Perhaps the abscess may now gradually heal, and no other treatment may be required; or it may be necessary to destroy the secreting surface of the bursa, by means of some

kind of caustic. The concentrated nitric acid
answers the purpose well. The sharp end of a
probe armed with lint may be dipped in the acid,
and applied for a few seconds to the inner surface
of the bursa. A thin slough will, of course, be
formed; on the separation of which the bursa will
probably granulate, contract, and heal; otherwise
the application of the caustic must be repeated.

After what I have said it is needless for me to
offer any further observations as to the means
which may be adopted with a view to prevent the
bunion from being regenerated.

A case came lately under my observation, in
which what appeared like a bunion on the inside of
the ball of the great toe contained an albuminous
substance, of the consistence of the vitreous
humour of the eye, similar to what is met with in
the ganglions which we meet with in the neigh-
bourhood of the wrist, and in some other situa-
tions. Whether this was an ordinary bunion, in
which the vessels of the bursa assumed the action
of secreting this particular substance, or whether
it was really a common ganglion, I was unable to
determine. The treatment which I adopted was
that of opening the cyst freely, and applying the
concentrated nitric acid to the inner surface. It
was necessary to proceed with great caution, lest I
should injure the joint or bone beneath, and there-
fore several very light applications were required.
My object was to destroy the secreting surface,
and obtain a granulating surface in its place; and
when I last saw the patient, previously to her
returning into the country, I had reason to believe

that I had succeeded ; but I have not heard of her
since.

A tumor is occasionally formed on the instep,
which, although neither a corn nor a bunion, bears
a near relation to them.   It is met with in young
men who wear tight boots, and the usual situation
of it is near the articulation between the internal
cuneiform bone and the metatarsal bone of the
great toe.   The tumor is under the skin, hard and
immovable, so that it seems to a superficial
observer to be an enlargement of the bone itself.
The skin over it is in a natural state, except in
cases of long standing, in which the cuticle be-
comes somewhat thickened.   I have had no oppor-
tunity of dissecting the parts affected with this
disease, and am uncertain as to the exact texture
in which the deposit takes place.

A tumor of this kind is productive of as much
inconvenience to the patient as a corn, and requires
the same treatment.   He should for a time leave
off boots altogether ; or, if he cannot well do this,
the boot-maker should be directed to procure a
last with a projection in that part of it which
corresponds to the situation of the tumor, so that
the boot may not make any pressure on it.   A
piece of thick buck-skin leather spread with adhe-
sive plaster, or a compress made of amadou, such
as I have already described, and cut into the shape
of a horse-shoe, will also give immediate relief, and
ultimately produce a cure.   But the cure of course
will not be permanent if he continues to wear
tight boots afterwards.

I have several times seen a tumor, similar to

that which I have just described, in school-boys, situated on the fore-part of the head of the tibia, at the insertion of the tendon of the extensor muscles; apparently the result of kneeling or clambering on the knees. Although of no real importance, it is often a subject of great anxiety to parents. A tumor of the same kind is also occasionally met with near the inner condyle of the femur, in those who ride much on horseback. In either case the avoiding pressure is sufficient to relieve the patient of whatever inconvenience the disease produces.

LECTURE XII.

ON THE ADMINISTRATION OF MERCURY IN CASES OF SYPHILIS.

THE subject of the present lecture is one of considerable interest—the administration of mercury in cases of syphilis. My object is not to enter into details, but to offer some general observations, which at this time, when there is much difference of opinion respecting the use of mercury, and much random practice in its exhibition, may, I trust, be of some service to you when you first enter on the practice of your profession.

Mercury was employed for the cure of syphilis very soon after the disease was first recognised in Europe,—I believe within three or four years after the siege of Naples, where it was formerly supposed that it first broke out; and from that time to this, through good report and through evil report, in spite of the too strong prejudices of some in its favour, and of others against it, it has maintained its general reputation in the profession. However, at different periods, other remedies have been proposed as substitutes for it. Sir William Fordyce wrote a pamphlet to show that syphilis might be cured by sarsaparilla. Mr. Grant, an army surgeon, alleged that it might be cured by opium. Some one asserted that ammonia would produce

the same effect; and others have advocated the
exhibition of nitric or nitro-muriatic acid. Guai-
cum, hemlock, muriate of barytes, and other
remedies which it is needless to enumerate, have
had their respective advocates. In Spain, Portugal,
the West Indies, the Islands of the Pacific Ocean,
and other hot climates, it has been stated, on what
seems to be good authority, that persons recover
from the venereal disease who never take a particle
of mercury. Notwithstanding what I have just
stated, in the beginning of this century there was
a prevailing notion that mercury not only was a
specific for syphilis, but that the disease could
never be cured without it. Mr. Abernethy, in his
work on what he calls pseudo-syphilis, lays it
down as a rule that syphilis is uniformly progres-
sive if mercury be not administered; and accord-
ingly, if a case came before him in which the
symptoms yielded to other treatment, he pro-
nounced that the disease was not syphilis. It is
true that he gave no reason for this extraordinary
assumption; it was a complete *petitio principii;*
and this illogical conclusion has much diminished
the value of this part of his works. Not long
after this opinion was published by this distin-
guished pathologist, (an opinion which, as I have
already observed, was generally adopted by the
profession,) a friend of mine, the late Mr. Rose,
who was afterwards surgeon to this hospital, insti-
tuted a series of experiments on the subject. He
had ample opportunities for conducting them, as
he was surgeon to one of the regiments of guards.
Soldiers in this metropolis cohabiting with the

lower order of prostitutes, are, as you may sup-
pose, very liable to become affected with syphilis.
For a year or two he treated every soldier labour-
ing under the disease that came into the regi-
mental hospital without mercury.   I had frequent
opportunities of seeing these cases, and from time
to time I watched their progress with him.   Every
sore upon the organs of generation got well under
his management.   Many of them, probably, were
not venereal, but of course many of them were.
Not only did the sores heal, but the consequent
hardness of the cicatrix disappeared.   Some of the
secondary symptoms were slight, and others were
severe ; in fact exhibiting nearly the usual cha-
racter ; but they were removed without the use of
mercury.   Mercury was had recourse to in only
two or three cases, and there it was rendered
necessary to save the eye, in consequence of
inflammation of the iris supervening.   From these
facts Mr. Rose came to a conclusion, which these
cases certainly seemed to justify, namely, that
syphilis was curable without the use of mercury.
Other army surgeons repeated these experiments
with the same results ; and I believe that the
disease is even now treated in the army to a great
extent on the same system.

These observations led a certain part of our
profession to a view of the subject entirely different
from that which had been entertained previously.
They not only alleged that mercury was unneces-
sary for the cure of syphilis, but that it did a great
deal of harm, and that the introduction of it into
the system was actually worse than the disease
which it was intended to cure.

With respect to the recovery from syphilis without the aid of mercury, I may observe, that it appears to me that you cannot properly apply a rule, drawn from the observation of what happens in soldiers, to society in general. In all cases the effects of a disease depend very much on the kind of constitution that is attacked. Students coming from the country are often astonished by the difference in recovery from compound fractures in a London hospital, and where they have seen them occur in a purer air, and in another order of persons. In London, the cholera destroyed 300 out of 18,000 inhabitants; in Sunderland it carried off a very large proportion (I forget exactly what) of the population; as it did in Paris also. In London, its destructive influence was felt, not among the affluent classes, but among those who were ill fed, ill clothed, and breathing a poisonous atmosphere. So I apprehend it to be with syphilis. Soldiers are persons of strong constitution, and in good health, otherwise they would not be received into the army. They are not much advanced in life; they are taken into a regimental hospital, are kept under the constant eye of the surgeon, and are dieted exactly as he pleases. The general health is attended to in every respect; they are not allowed to be exposed to the influence of atmospheric changes, and, in short, from their constitution, and from the situation in which they are placed, it may well be supposed that they have a power of throwing off morbid poisons not enjoyed by the great majority of other persons. Experience fully confirms these observations. In this

hospital I have tried to treat syphilitic patients without mercury with very little success indeed; and I venture to say, that in private practice the attempt to adopt this plan, as a general rule, will always be a failure. Sir William Whymper, who was formerly surgeon-major of the Coldstream Guards, and who saw a great deal of syphilitic practice, told me that he could manage the cases of private soldiers in this way, but not those of the officers. Mr. Rose at first was led to believe that he might adopt the method of treatment which he had followed in the army in private practice also; but he soon found that here it was unsuccessful, and at last he gave mercury like other persons. In cases where he did not administer it, he found that he was continually becoming involved in difficulties.

With regard to the other notion, that mercury often tends to aggravate the disease instead of curing it, I know that its injudicious use will often produce that effect; but, from the experience which I have had in these matters, I am satisfied that it is not so with its wise and judicious administration. It has been said that diseases of the bones do not occur where mercury is not employed; and, indeed, I believe that in patients in whom mercury has been injudiciously used, disease of the bones is more frequently met with than it was in Mr. Rose's military patients, in whom mercury was not had recourse to. I know, also, that when mercury is given for other diseases—for example, for an hepatic affection, or for diseased testicle,—it will sometimes be productive of nodes afterwards.

Nevertheless, I have no doubt that syphilis will give rise to disease of the bones, even where no mercury has been administered. A gentleman had a sore which no one doubted to be venereal. He took no mercury, and it healed. I forget the exact symptoms which followed, but when I saw him in consultation with Mr. Rose, a couple of years afterwards, he had extensive disease of the bones of the nose, and the disease was still going on, in spite of various remedies which he had used. Still he had taken no mercury. We agreed that the best thing to be done was to put him under the mercurial influence. He was to have taken lodgings in London, for the purpose of going through a course of mercurial inunction; but in the meantime he had a fit of epilepsy, and this was succeeded by a second and a third fit. He became maniacal, and died. I do not know that his body was examined after death, but neither Mr. Rose nor myself doubted that the disease had extended up the ethmoid cells, affected the cribriform lamella of the ethmoid bone, and ultimately the brain and its membranes. I may mention another case, which also had been treated by Mr. Rose without mercury. A venereal sore healed with some simple treatment, but a few months afterwards the patient was seized with pain in the limbs which was considered to be neuralgic. By and by there were nodes on the skin and elbow. He had never had any disease before this chancre, and we could not but suppose that the poison had entered into the system, and that, without giving rise to the first order of secondary symptoms, it

had gone on at once to the second order, and affected the bones. The conclusion of the case was, that the patient got entirely well under the use of sarsaparilla.

Experience proves to me, and I am sure that it will prove to you also, that we have hitherto found no remedy having the same power of extinguishing the venereal poison as mercury. But then it must be judiciously administered at the time, and in such cases only as are proper for it; and without all this care it may do great harm. In this there is nothing at all remarkable, for (with the exception, perhaps, of sarsaparilla,) I do not know any medicine capable of doing great good, that may not, under certain circumstances, operate as a poison. I saw a gentleman very nearly killed by an over-dose of quinine; others have died in consequence of the imprudent exhibition of the iodide of potassium; and others have been killed by arsenic. A remedy that is strong enough to do good is almost invariably strong enough to do harm, if it be not used properly.

You are not, then, to suppose that you are to administer mercury as a matter of course in all cases of syphilis; but the general rule is, that it should be given; and it being so, I shall endeavour to point out briefly, not the cases in which you may exhibit it, but those in which you should either not give it at all, or give it with especial caution.

There are persons of a certain delicate constitution, having what is called a scrofulous diathesis, disposed to phthisis, and other diseases of the same class, and here you should not administer mercury

until you are quite sure that it is wanted.   Never-
theless, I believe that scrofulous persons, who
really have syphilis, are best treated by mercury.
If mercury be to them an evil, syphilis is a still
greater evil.   Scrofulous diseases are more espe-
cially developed after the system has been affected
by a morbid poison.   Those who are disposed to
phthisis will have tubercles in the lungs after
scarlatina, measles, and small-pox, and it is just
the same after being affected with syphilis.   En-
largement of the glands of the neck often takes
place where the system is disturbed by the syphi-
litic poison; and this shows you what may be
expected as to other organs.   When in these cases
it is absolutely essential to exhibit mercury, it must
be done with great caution.   The remedy must
be given in moderate doses, and the patient
must be carefully watched all the time that he
is using it.

Those who appear to be in strong vigorous
health are not always good subjects for mercury.
There are many persons of this description, who,
in consequence of drinking a large quantity of wine
and of other irregular habits, are in a state of con-
stitution that is very unfavourable to its exhibition.
It is true that the poison of syphilis in such per-
sons often produces frightful and intractable
symptoms.   But, nevertheless, it is best to defer
the use of mercury until the constitution has been
improved, for if you administer it sooner you
have to contend with the ill effects both of the
mercury and of the disease.   If you cause the
patient for some time to lead a more regular life,

and by these and other means improve his general
health, you may then resort to mercury with
advantage, and probably cure the disease.

There are some individuals in whom, for
reasons which we cannot assign, mercury always
operates as a poison, and you cannot tell who
these individuals are until you have made the trial.
This is in itself a sufficient reason why you should
carefully watch every patient in whose case you
administer mercury, especially if he has not taken
it before.

In the case of primary sores, where there is a
great deal of inflammation in the neighbourhood,
it is scarcely ever right to employ mercury in the
first instance, for the probability is that it will
cause the inflammation to terminate in sloughing.

The inflammation in such cases must be com-
bated by bleeding, purging, and other means, and
it is better to patch up the sore as well as you can,
and let the disease go on, until it has produced
secondary symptoms, rather than to exhibit mer-
cury under the circumstances just mentioned.

In cases of phagedenic and sloughing chancre,
where its condition depends on a bad state of the
patient's constitution, it is always wrong to give
mercury at first, for it will aggravate the disease
and make it spread more rapidly, But there are
cases in which the phagedena depends on the
intense action of the venereal poison ; and here, as
I shall explain presently, mercury may be given.

In cases of secondary symptoms, you will occa-
sionally find that mercury, instead of acting upon
and curing them, will have an opposite effect,

aggravating the symptoms; so that the more
mercury you give the worse they become. This,
as I have already explained, may depend on the
patient's previous habits of life; or it may be the
result of some peculiarity of constitution, original
or acquired, or of the mercury having been admi-
nistered in an injudicious manner. Under these
circumstances you must, for the present at least,
suspend the use of the remedy. The patient
may appear to get well when first he leaves it off,
yet he will probably subsequently require it again.
To illustrate this last observation I may mention
the following case. A lad was brought into this
hospital with a sore throat, and what appeared to
be a syphilitic eruption in different parts of the
body in a state of painful ulceration. He was
emaciated, and altogether very ill. I found that
he had been taking mercury under a private prac-
titioner, in large quantities, for not less than
five months. His gums had been, and still were,
exceedingly sore, and it appeared that in proportion
to the quantity of mercury taken so had the
symptoms become more urgent. I directed him to
leave off the mercury, and I gave him sarsaparilla.
In a short time the eruption disappeared, and he
was discharged as cured. After the lapse of a few
months he came to the hospital again, with a sore
throat and a return of the eruptions, having taken
no mercury in the interval. I gave him sarsapa-
rilla a second time, and he got well, but the
eruption did not disappear so rapidly as in the
first instance. I still thought it imprudent to
have recourse to mercury. After he had been

away three or four months more, he came to us a third time, with a recurrence of his old symptoms. I again resorted to sarsaparilla, and the eruptions yielded, but more slowly than on the previous occasions. Towards the conclusion of the time that he was in the hospital iritis supervened, for which I gave him the bichloride of mercury for a short time, until the iritis had subsided. Some two or three months afterwards the disease again broke out, with nearly the same symptoms as before. Now he went into the Lock Hospital, under the care of the late Mr. Blair. This was fourteen months after he first came to Saint George's, and he had taken no mercury, except for the iritis, during the whole of that time. Mr. Blair now, very properly, put him under a course of mercurial inunction, and I believe that he was permanently cured. If I had done this when he first came under my care he would probably have died. I might mention other cases illustrative of the same point if it were worth while to do so.

I have said that, in the great majority of cases, mercury is the best remedy which you can employ for the cure of syphilis; provided always, that it be judiciously and properly administered. There are different ways of exhibiting mercury. It may be given internally; it may be applied externally, in the form of ointment, or by the method of fumigation. The mercurial preparations that are given internally are various; blue pill, the *hydrargyum cum cretâ*, calomel and opium, Plummer's pill, iodide of mercury, bichloride of mercury, and some others.

You will find it very convenient to give mercury internally, in the shape of pills, when you wish to affect the system rapidly, as, for example, in a case of iritis. A patient labouring under iritis is in danger of becoming blind ; you must place him under the influence of mercury as soon as possible ; and this is better accomplished by giving calomel and opium than in any other way. In slighter cases of syphilis the disease may be cured very well by mercury exhibited internally. There are some patients so circumstanced that they cannot take it in any other manner ; because they are living with their families, and for other reasons ; and altogether, there are a great many instances in which it is either convenient or necessary to exhibit mercury internally. But if you ask me which is the best way of using mercury where the symptoms of syphilis are not of the very mildest character, I must say that that by inunction is infinitely to be preferred. Mercurial inunction is dirty, laborious, and troublesome, and it makes the matter public to the family in which the patient lives ; for one or other of these reasons it will generally be unpleasant to him. But it has these advantages : it is much less liable to gripe or purge ; it cures the disease a great deal better, and does not damage the constitution half so much, as mercury taken by the mouth ; nay, I will go so far as to say, that, except in the slighter forms of the disease, you really cannot depend upon any other kind of mercurial treatment for the production of a cure. You may patch up the disease by giving the remedy internally, but it will return

over and over again, and then you may cure it
at last by a course of mercurial ointment pro-
perly rubbed in. I say properly rubbed in, for
much depends on this. The patient, if not well
instructed, will perhaps continue the friction for a
few minutes; but it ought to be continued before
a fire at first for at least half an hour, and very
frequently for three quarters of an hour. After
some time the ointment will be absorbed more
readily, and it may then be rubbed in for a shorter
period. Where the symptoms are not of a mild
character the patient should, if possible, be con-
fined to the house, except perhaps for an hour or
two in a fine day. The going out into the fresh
air (as Mr. Pearson observed long ago) will coun-
teract the influence of mercury. You never can be
responsible for thoroughly eradicating the disease
where the patient is at all exposed to cold or wet,
nor where he does not lead a most regular and
careful life in all respects.

In all cases of syphilis in which you employ
mercury, remember that you have two objects in
view; the first, to cure the present symptoms; the
second, to prevent a return of the disease. It seems
to me, that a great number of practitioners at the
present day regard only the first object, and lose
sight of the second. I have frequently seen a
person who has taken mercury for a chancre, which
has, perhaps, healed in a fortnight, and then has
left it off, although a very hard cicatrix has been
left. Under such circumstances, in nineteen cases
out of twenty there will be secondary symptoms.
If mercury be taken for the primary symptoms,

the patient should never leave it off till the hard cicatrix has disappeared ; nor, indeed, for some time afterwards ; and so, where it is given for secondary symptoms, it should be continued for a considerable time after they have disappeared. A man has an eruption of the body ; it fades away, under the use of mercury, in the course of a month ; but the remedy must be used as a prophylactic for another month. If a patient be confined to his house, or only allowed to go out a little in a fine day ; if he be made properly to rub in the ointment, and the course be carefully watched and continued for some time after the symptoms have subsided, you will, I am satisfied, in the great majority of cases, make a real and permanent cure of the disease. I suspect that this is not the way in which it is administered by the majority of practitioners at the present time, but it was so administered formerly. You must not suppose that we have advanced alike in all departments of surgery ; indeed I am sure that in some things we have gone back, and I believe this to be one of them. I am much mistaken if the mercurial treatment of syphilis, as employed by the late Mr. Pearson during the greater part of his life, was not as nearly perfect as possible. At any rate, it was much more successful than the less careful treatment of modern practitioners. That gentleman was surgeon to the Lock Hospital ; and having no general hospital to attend to, the powers of his mind were more especially devoted to the study of syphilitic diseases, and their treatment ; and the practice which I have now recommended was that

which he usually adopted. When I was young in my profession, I had frequent opportunities of meeting him in private practice, and of learning how profound a knowledge of the subject he possessed ; and I may take this opportunity of recommending for your perusal his treatise on the various articles of the materia medica recommended for the cure of syphilis, in which he offers many excellent observations on the use of mercury, and enters into details in a way in which it is not my object to enter into them at present.

I may here call your attention to a class of cases in which you may employ mercurial inunction with the greatest advantage. Children are sometimes born with syphilis, the father or mother having been affected with it. The child looks thin, and is of small size ; and, instead of thriving, becomes thinner and thinner. At the end of three weeks it is covered by a red scaly eruption ; there are aphthæ in the mouth, with chaps about the lips and the anus. The symptoms are well marked, and tell you at once the nature of the disease. I have tried various ways of treating such cases. I have given the grey powder internally to the child, or some kind of mercury to the wet nurse. But the mercury given to the infant by the mouth gripes and purges severely ; that given to the wet nurse cannot be depended on ; and at all events the latter is a very cruel and scarcely justifiable practice. The mode in which I have treated such cases for some years past is this : I have provided a flannel roller, on one end of which I have spread some mercurial ointment, — say a drachm, or more ;

and I have applied the roller, thus prepared, not very tight, round the knee ; repeating the application daily. The motions of the child produce the necessary friction ; and the cuticle being thin the mercury easily enters the system. This causes neither griping nor purging ; in a child it does not even in general cause soreness of the gums ; but it cures the disease. Very few of those children ultimately recover in whom the mercury has been given internally ; but I have not seen a single case in which this other method of treatment has failed.

Mercurial inunction may be employed in certain cases in which mercury taken internally would absolutely do the greatest harm. For example : a gentleman had a phagedenic sore upon the penis. It could not be said that he was in ill-health before, and therefore there was reason to believe that the disease was spreading merely from the intensity of the venereal poison. He took calomel and opium ; the gums became tender ; but the sore became worse than before, spreading more rapidly, until the greater part of the glans was destroyed. The ulceration showed no disposition to stop ; resisting all modes of treatment ; until, at last, he was put on a course of mercurial inunction. Then the progress of the ulceration was at once arrested, and the sore healed as fast as possible. I have seen several cases of the same kind.

I have already mentioned another mode of administering mercury, namely, by fumigation. It may be applied, locally, to the part affected ; or, generally, to the whole person. In the

latter case the patient is placed in an apparatus like that used for sulphureous fumigation ; but, instead of sulphur, the black oxide of mercury is thrown upon the hot iron. If you wish the system to be speedily affected, you may direct the patient to hold his head in the inside of the bath for two or three minutes, and inspire the mercurial vapour. I have used this with success in several cases where it was my object at once to affect the system ; but I have found that Mr. Pearson's objection to it is very well founded ; namely, that it is difficult in this way to regulate the mercurial action. You may affect the system too much, or too little ; and you may be taken unawares by the patient's gums becoming all at once excessively sore. Excessive soreness of the gums is always to be avoided ; but I may take this opportunity of observing that you cannot thoroughly depend on mercury as an anti-syphilitic remedy unless the gums be made rather sore, and there be some degree of salivation.

But, as I have already stated, there are cases in which mercury is not proper at all, and in which there are reasons for dispensing with it, either altogether, or for a time. In some individuals, in private practice, as well as among soldiers, by mere attention to the general health, the disease will be thrown off. A gentleman had a well-marked venereal eruption. He was in London, and was going to take mercury, but was called into the country ; and I, therefore, advised him to defer it for the present. Shortly after, being in the country, and under the influence of a purer air, all the symptoms

vanished. Similar cases are recorded in Mr. Aber-
nethy's book ; and he, as I have already mentioned,
concludes (somewhat hastily) that the disease in
such cases was not syphilitic. After a mercurial
course, it is not sufficient to let your patient go,
and say, " Your disease is at an end." It is very
important that he should be kept in good health
afterwards. Where the disease has been allowed
to remain for a long time in the system, it is often
never so thoroughly eradicated but that, if the health
be broken down, it may again show itself. It is
always well, after a long mercurial course, to put
the patient through a course of sarsaparilla, with
a view to remove the debilitating effects which the
mercury produces. The following case will show
how much depends on the state of the general
health. A gentleman had secondary symptoms ;
I put him through a course of mercurial inunction,
and for ten weeks he was altogether confined to
his house, and most carefully attended to. He
took mercury for some weeks after the eruption
had disappeared. Appearing to be quite well, he
went to Lisbon, and continued well. But at the
end of a year he took cold ; and this was followed
by a severe attack of erysipelas. A practitioner
whom he consulted very indiscreetly bled him to
a large extent. An enormous abscess formed ;
and between the erysipelas, the abscess, and the
loss of blood, his health became completely broken
down. While in this state he had a return of
venereal symptoms, but of a more severe character
than formerly. An English surgeon, resident at
Lisbon, put him under a course of mercury, and

cured him.   In cases where symptoms are aggravated by the use of mercury, they may often be removed by sarsaparilla; and in other cases they will subside under the use of the iodide of potassium.   It is very much the custom now to administer the latter remedy in cases of syphilis; and there is no doubt that it is productive of the very best effects in cases of disease of the bones, whether syphilitic or mercurial.   It is also very useful in some cases of sore throat and eruptions, where there are some especial reasons for not having recourse to mercury.   But if you ask me whether, in such cases, you can rely upon it as you can upon mercury, I say, "Certainly not." You may remove slight symptoms by giving it in small doses for a long time; and more severe symptoms, by exhibiting it in larger doses; but in the latter cases, so far as I have seen, it does not make a permanent cure, and the symptoms return, even under the use of the remedy.   As a prophylactic, iodine is not to be compared with mercury, although it may be taken, under certain circumstances, with the greatest advantage.

I have spoken of the necessity of administering mercury, not only till the symptoms are relieved, but for a considerable time afterwards.   But you may ask, whether a long course of mercury be not more likely to injure the constitution than a short one?   Undoubtedly it is; and that is the very reason why you should prefer a long course.   If the course be a short one, the disease is sure to return; you have then to repeat it, and again the disease reappears.   Thus you have repeated

courses; and not only is the system weakened by the mercury, but the disease, whenever it does return, assumes a more formidable character than before. But if, on the other hand, you put the patient through a long course in the first instance, such a frequent recurrence to the use of mercury will be unnecessary. A patient who takes mercury for a chancre, for a month or five weeks, may probably never want it again; but if he take it only for a fortnight, he has secondary symptoms, and then it will be required for at least six weeks, perhaps for ten; so that that which is a short course at first becomes a long one in the end.

LECTURE XIII.

ON TIC DOULOUREUX, OR FACIAL NEURALGIA.

" JOSHUA KINGETT, forty-eight years of age, was
" admitted into the hospital on the 14th October
" 1835.   He stated that for the last ten months
" he had been suffering the most severe pain,
" which was entirely confined to the left side of
" the face ; that this pain at first had an inter-
" mittent character ; but that latterly it had
" become constant ; and frequently was so acute
" that, to use his own language, he would have
" rejoiced if any one had knocked him on the
" head.   At these times he seemed almost to lose
" the sight of his left eye, and very often suffered
" from tooth-ach.   At the time of his admission
" the pain was chiefly confined to the cheek and
" nostril, which were puffy, and tender to the
" touch.   There was no disease to be observed
" on looking into the nostril.   The bowels were
" always torpid, and the tongue was covered with
" a whitish-brown fur.   He was directed to apply
" the veratrine ointment, in the proportion of a
" scruple of the veratrine to an ounce of lard.   A
" portion of this was to be rubbed in on the
" cheek twice a day, and he was to take five
" grains of blue pill every night, with a draught
" containing five drachms of infusion of senna,

" five drachms of compound infusion of gentian,
" a drachm of tincture of senna, and a drachm of
" sulphate of magnesia, every morning.

"   " On the 23d, having pursued this plan for
" about a week, he thought that he was a little
" better.   A bad tooth was discovered in the
" upper jaw, which was extracted.   The tongue
" was a little cleaner.   He was directed to take
" infusion of rhubarb and columbo, of each six
" drachms, with a drachm of compound tincture
" of cardamoms, and half a scruple of carbonate
" of potass, three times daily.   He was to go on
" taking the blue pill."

On the 29th, the report runs thus : — " He
" has improved rapidly ; the pain is now very
" tolerable ; the bowels are open twice daily ; the
" tongue is nearly clean."

On the 7th November it is said :—" The pain,
" which had almost left him, returned with great
" severity two days ago.   He has had no sleep
" since, in consequence of it. The tongue is again
" white and furred.   The medicine was not suffi-
" cient to act on the bowels, which have been
" confined for the last two days.   He was directed
" to take five grains of blue pill every night, and
" a sufficient dose of compound infusion of senna
" and sulphate of magnesia every other morning."

On the 15th it is said that " he had been again
" relieved   as   soon   as   the bowels were well
" opened."

On the 17th November I placed him on the
following plan of treatment.   He was to take five
grains of blue pill, five grains of compound extract

of colocynth, with three grains of extract of lettuce, every night. This medicine acted on his bowels, so that he has been purged ever since he took it, two or three times daily. He has continued to take it up to the present time. The tongue is now quite clean. He is entirely free from any thing that deserves the name of pain, although he has still some feeling of uneasiness in the face.

A violent pain in the face, attacking the patient at intervals,—a pain so violent that the patient wishes that somebody would destroy him,—and yet there being no disease perceptible in the parts to which the disease is referred: it is to a pain of this kind that we commonly apply the name of *tic douloureux*, or, as some call it, with more propriety, *facial neuralgia*. We must regard this case, then, as one of tic douloureux, or, if you please, facial neuralgia.

You will observe, that, besides other classifications which you may make of the pains that occur in disease, you may arrange them under these two heads:—There are cases in which the pain is felt where the disease exists, as there may be inflammation in the knee, and pain in the knee in consequence; carcinoma of the breast, and pain in the breast in consequence; disease of the liver, and pain therefore in the hepatic region. Then there are other cases in which the pain is referred to parts which are not actually the seat of disease. Thus, there may be pain in the knee while the real disease is in the hip; there may be pain in the shoulder while the real disease is in the liver;

there may be pain in the breast, while the real disease is an hysterical state of the constitution generally.

Tic douloureux, or facial neuralgia, belongs to this last class of pains. The pain which is felt is referred to some part or other of the face, or to the whole of one side of the face, and yet there is no disease there. You are not to suppose that the cause of the pain in this complaint is always the same; the fact is, the pain is but a symptom, and it may depend upon different causes; so that among those patients who are said to be affected with tic douloureux, the real nature of the disease varies very much in different cases. There may be half a dozen of persons with tic douloureux in the face, the symptoms in all of them being the same, or very nearly the same, and the real disease may be different in every one of them. The pain, as I have said, has the same character in all these cases, and it differs from the pain of most other nervous affections. You will observe that the branches of the fifth pair are all under particular anatomical circumstances; that they all proceed from that remarkable plexus which is bathed, as it were, in the blood of the cavernous sinus, and that the branches of it all run through bony structures; the second and third branches especially being enveloped in bone to a great extent; and probably it is from one or other of these anatomical circumstances, or from both of them combined, that the pain derives its peculiar character.

The pain in all these cases, whatever may be the cause of it, generally comes on gradually. At

first it is a pain which, though severe, may be
borne; but at last it becomes quite intolerable,—
so intense that the patient often says he would
rather die than bear it. At first he complains of
an odd twinge every now and then in the face;
and it generally begins in the cheek where the
second branch of the fifth pair of nerves is distri-
buted. The twinge then becomes more severe,
and recurs more frequently. At first it recurs
only two or three times daily, and lasts for an
instant; then the twinge becomes more severe, of
longer duration, recurring several times in the
twenty-four hours; and so it goes on increasing.
When the disease is at its height, the patient is in
as wretched a condition as you can well imagine a
human creature to be in. The pain attacks him
every quarter or half hour, sometimes oftener,
coming on suddenly and unexpectedly at un-
certain intervals. He states that at first there
is a sensation of spasm, which is followed by a
violent and continued pain, accompanied in some
cases with a sense of pressure acting from above.
You see the patient acting with all the muscles of
the trunk, as if it were necessary that he should
make this effort in order to support himself under
a heavy weight that was forcing him to the
ground. This will last perhaps for two or three
minutes, and then the pain goes off, and he is
again quite well till the attack returns. The
recurrence of the pain is always readily induced
by the patient's attention being directed to it. If
you ask him " how his face is to-day?" the attack
comes on directly; but if you hold him in earnest

conversation upon any other subject, it may stay away for half an hour. The patient often is prevented by the pain from going to sleep ; but having once fallen asleep, he may continue so with out the pain recurring for several hours.   I have known this to happen even in the very worst cases.

When the pain comes on there is sometimes violent spasmodic contraction of the muscles of the face ; and perhaps it is this which causes the face, on the side on which the disease exists, to become in some instances swollen and puffy, and the conjunctiva of the eye on that side to be red and blood-shot. I said that the pain generally begins in the cheek ; and often it is altogether confined to the parts to which the second branch of the nerve of the fifth pair is distributed ; but in extreme cases, it will sometimes extend to the forehead, that is, to the parts supplied by the first branch of the nerve of the fifth pair, and to those supplied by the third branch, that is, to the chin and even to the teeth. In some cases the tongue and palate are affected also.

In many cases the disease torments the patient for a month, six weeks, or six months, or even for a longer period, and then, without any evident reason, vanishes, and he continues free from it for an uncertain period ; after which it recurs, continues perhaps as long as before, and then again subsides. In other cases the disease may vanish, not for a time but altogether, the patient obtaining a complete recovery. In other cases again there is never an actual giving way of the disease ; it goes on tormenting the patient day

after day, month after month, year after year. In such cases there is generally, if not always, some kind of organic disease; in consequence of which other symptoms supervene ultimately. Of these last-mentioned cases I shall speak again presently.

In addition to what I have already stated it is worthy of notice that the disease affects only one side of the face. I never met with a case in which it affected both sides.

On what causes do these frightful symptoms depend? Many persons who thus suffer have a diseased tooth, and then it is very probable that he or his medical attendant believe that this may be the cause of the pain, and the tooth is drawn in consequence. But I never knew a case in which a patient was relieved of a genuine *tic douloureux* by the extraction of a tooth; and I remember in a conversation which I had with an experienced dentist some years ago, that he told me that he had very frequently been called upon to extract teeth on these occasions, and that he was not aware that the operation had been of service in any one instance.

I have said that the disease may depend on different causes. Sir Henry Halford published a paper, in which he gave an account of some cases having (as it was supposed) all the characters of genuine *tic douloureux*, in which the symptoms seemed to be connected with a diseased condition of the bones of the face; and I have no doubt that such is their origin in some instances. There was a man in this hospital, suffering from a pain in the cheek having the characters

which I have just endeavoured to describe, and in whom there was disease of the bone of the upper jaw. If I remember rightly (for I have preserved no notes of the case) he went through a course of sarsaparilla. At all events a piece of bone at last exfoliated, and then the pain was relieved. I saw another case in which there was pain very like that of *tic douloureux* existing in combination with disease of the upper jaw, but of which I know not the result. But these are rare occurrences. It is a great mistake to suppose that diseased or dead bone is an ordinary cause of this disease. The other sources to which it may be traced are various. You will find it sometimes in young women of an hysterical constitution, a product of hysteria. It would appear that hysterical pain, when it is referred to parts supplied by the nerve of the fifth pair, assumes this peculiar character. At other times the pain is intermittent and periodical, depending on that peculiar state of system which produces the phenomena of ague, and it may then be cured, as ague is cured, by quinine or arsenic. In other cases again the disease evidently depends on disease of the digestive organs, and the patient is cured by great regularity as to diet, and by such a course of medicine as is calculated to put the digestive organs into a more healthy condition. In another order of cases the pain in the face is the result of organic disease in the brain. The late Dr. Pemberton, who was for many years physician to this hospital,—an excellent practitioner, and engaged in a very large professional practice at the

west end of London,—in the midst of his career of
prosperity became affected with the *tic douloureux*,
and suffered from it in the most horrible manner.
I never saw any individual under the same circum-
stances whose sufferings were equal to his ; but I
am led to mention his case at present, because,
after having retired into the country, he died at
last with symptoms of cerebral disease.

There was a gentleman who had suffered from
the *tic douloureux* in the face for a very long time.
By and by the pain in the face ceased ; but he
was attacked with fits of epilepsy. Then there
was a *ptosis*, or a dropping down of the upper eye-
lid, on the side in which the *tic douloureux* had
existed previously. At last, after a more than
usually severe fit of epilepsy, he fell into a state
of apoplexy, and died. Mr. Green, Mr. Freeman,
and myself (by whom he had been attended) exa-
mined the body. We found all the membranes of
the brain bearing marks of chronic inflammation.
The vessels connecting the *dura mater* to the bone
were unusually large ; the *tunica arachnoides* was
thickened, and, at the upper and posterior part of
the left hemisphere of the cerebrum, it was adhering
to the inner surface of the *dura mater* in a spot
about an inch in diameter. The cerebrum generally
was soft and vascular, exhibiting a red mottled
appearance in many places. The softening of its
substance was most distinct in the *crura cerebri*,
the *fornix*, and adjacent parts. The nerves of the
fifth pair were carefully examined, as far as they
lay within the cranium, but they presented no
morbid appearances.

There are many cases in which you cannot trace the *tic douloureux* to its real source. There is something or another, somewhere or another, in the system, which acts as a source of irritation to the nerves of the face ; but where that something is, and what it is, we cannot discover. Indeed, generally speaking, I should say that to trace local nervous affections to their origin is one of the greatest difficulties that we meet with in the practice of our art. The disease may be in one part of the body, and the pain or spasm which it produces may be in another. I have known a patient have neuralgia of the foot, which depended on a stricture of the urethra, and which, whenever it occurred, was invariably relieved by the use of a bougie. I have known another patient have neuralgia of the foot depending on internal piles, which came on when the piles were protruded through the anus, and went away when they were reduced. I have known a spasmodic wry neck, or a nervous pain in the back, to alternate with insanity.

If it were worth while to do so, I might mention other cases illustrative of this observation, that the disease may be in one part of the body, and, from some nervous connexion, it may produce pain in some other part of the body. We cannot explain the matter much further than this. I may, however, venture to make this additional observation —namely, that there is good reason to believe that the seat of those nervous communications on which such sympathies depend is for the most part not in the nerves themselves, but in a higher place— in the brain, or in the spinal cord.

Treatment.—The treatment of *tic douloureux*, of course, must differ in different cases. In some instances it may be relieved by one method; in others, by another; and I am afraid that we must acknowledge that in many cases it cannot be relieved at all. A very old operation, which had fallen into disuse, has been revived of late years— namely, that of dividing the trunks of the nerves, to the extremities of which the pain is referred. It has been said that if the pain be referred to the extremity of the second branch of the fifth pair of nerves, you should divide the second branch where it passes out of the infra-orbitary foramen on the face; that thus you will cut off the communication between the extremities of the nerve and the brain, so that the painful sensation may no longer be communicated to the sensorium. Now this would be very well if the seat of the disease were really in the extremity of the nerve; but there is no reason to believe that it is so, and there is every reason to believe the contrary.

The irritating cause, whatever it may be, manifestly acts not on the extremity of the nerve, but on its origin; and both reason and experience prove that the division of the nerves below the origin is of no service. I have myself performed this operation without the smallest benefit to the patient.

In the late Dr. Pemberton's case the branches of the nerves were divided by Sir Astley Cooper. Sir Astley did not recommend it, and, if my recollection be accurate, when Dr. Pemberton first applied to him to do it, he declined acceding to his

wishes. He did it at last in order to satisfy the patient ; but the division of the nerves, instead of giving relief, very much aggravated the evil. It is altogether an unscientific operation, from which we have no more right to expect benefit than we should have from the amputation of the testicle in a case of pain referred to that organ in consequence of a calculus being lodged in the ureter.

In those cases in which the disease has an intermitting and periodical character, you can always relieve it, as you may all other cases of intermittent and periodical disease, by the exhibition of quinine, bark, and arsenic. But then, if you give quinine, it must be in rather large doses; sometimes in very large ones. I saw this very morning a gentleman who had formerly a nervous pain in the back, almost as bad as tic douloureux in the face. It was intermittent and periodical. I told him, when he consulted me about it, that most probably the sulphate of quinine would cure him. He took ten grains daily without benefit ; he took twenty with little benefit ; and was not cured till he took half a drachm daily. Whether he had been supplied with genuine unadulterated quinine I will not venture to say ; but at all events he must have taken the medicine in very large doses. The combination of bark and arsenic, also, is an excellent remedy in these cases of intermittent and periodical disease ; but I generally prefer giving quinine first, it being a more innocent medicine, requiring no watching, and the use of it not being subject to the inconveniences which belong to that of arsenic.

I was consulted, in conjunction with another practitioner, concerning a young lady who had tic douloureux of the face. She was hysterical, and the disease had followed the occurrence of some circumstances which had occasioned great agitation of mind. The case was evidently connected with hysteria, and an irregular state of the menstruation. We gave her steel and ammonia in combination, which put her into better health; and, in the course of a few weeks, the tic douloureux, which had existed for many months, had disappeared.

In those very few cases in which you can trace the pain to disease in the bones of the face, you must, of course, instead of directing your attention to the pain, which is the symptom, endeavour to cure the disease in the bone which produces it. A portion of bone may exfoliate; and if the dead fragment had caused the pain by pressing or otherwise irritating the trunk of a nerve the pain may be then removed. In other cases the patient may recover under the use of sarsaparilla, or the iodide of potassium, which, as you know, act most beneficially in a great number of cases of disease of the bones; or, if these fail, he may try the effect of the bichloride of mercury, or calomel and opium, or some other mercurial preparation.

Where the pain depends on organic disease of the brain, you must, of course, direct your attention to the primary affection, although it is probable that, in the majority of cases, you will not be able to render the patient any real service.

If the tongue be furred, the bowels constipated,

and there be other indications of the ill perform-
ance of the digestive functions, you may look
to this as affording a probable explanation of the
neuralgia, and, at all events, under these cir-
cumstances the first thing to be done is to
ascertain what will be the result of restoring the
digestive organs to a more healthy condition. It
was on this principle that I proceeded in the case
to which I called your attention in the beginning
of this lecture ; and you see that so far as it has
yet been tried there is reason to believe that the
treatment will prove to be successful. As the
costiveness has been relieved, and as the tongue
has become clean, so has the pain in the face
abated. A vast number of diseases depend on de-
rangement of the digestive organs. You will meet
with cases proving the truth of this observation
daily ; and that a patient should suffer from *tic
douloureux* in consequence of a faulty condition of
the digestive organs is not more remarkable than
that he should have a sick headach from an over-
loaded stomach, or an attack of lumbago from
costive bowels.

But let us suppose that you cannot trace the
disease to its real source (and so it is in a great
number of cases) ; that the patient in other respects
is well ; that all the functions are properly per-
formed ; that there is this frightful pain, and you
have no clue to lead you to the seat of the original
malady, and therefore, no clue to the treatment
which you should adopt ; you are then driven to
the expedient of trying remedies empirically,
taking the chance of what they will do. This is a

very unsatisfactory mode of proceeding it must be acknowledged, but you have no alternative. You may give your patient quinine, which is useful in many cases of nervous pain, even though it be neither intermitting nor periodical ; or you may prescribe the carbonate of iron, which is supposed (and, perhaps, not altogether without reason,) to relieve many neuralgic affections also. Half a drachm of the carbonate of iron may be given three times daily, and the dose may be gradually increased to a drachm. I never knew any good to arise from increasing the dose beyond this ; and I can easily conceive that much harm may arise from it being given in those enormous doses in which, as I am informed, it is administered by some practitioners. It is easy to conceive, that where thus exhibited, the colon may be actually clogged by it, just as in other cases it is found clogged by magnesia, or Ward's paste, or cubebs pepper. Whenever you prescribe any of these insoluble substances, you should also prescribe an occasional purgative, with a view to prevent the accumulation of it in the bowel. I have been informed on good authority of the case of a person who died of inflammation of the bowels, the effect of large doses of cubebs pepper which had not been purged off ; and it is easy to conceive, that without proper precautions, the exhibition of large doses of carbonate of iron might cause the·same mischief.

If the quinine and carbonate of iron fail, it may then be worth while to try the effect of the sulphate or oxyde of zinc, the ammonio-sulphate

of copper, the solution of arsenic, or some other of those metallic salts which are occasionally useful in cases of epilepsy and other chronic nervous affections.

But having tried all ordinary means without benefit, are you to go on *ad infinitum* tormenting the patient with medicine? The first rule of our art is to do no harm, and if you have had recourse to all reasonable expedients without benefit, it is not advisable for you to go on making further experiments. *No one can be dosed constantly with medicine without the health being ultimately injured by it; and if you have not some reasonable grounds for giving medicine, you have no right to run the risk of doing harm by its continued exhibition.* It is much more wise, as well as much more honest, when you do not know what to do, to do nothing, and to advise your patient to wait and take the chance of the pain subsiding of itself, as in fact it does in a great many instances. But although you cannot succeed in curing him, you may often succeed in making his life less intolerable than it would be otherwise. Some patients are very much relieved by the use of opium; and there are a few with whom it can scarcely be said much to disagree, so that there is no objection to their taking it. Even in these cases, however, it should be exhibited only when the pain is most severe, as otherwise either the dose must be continually increased, or it will lose its influence altogether. The other narcotics, such as the extracts of henbane, lettuce, or of the white poppy, are of no use except in the very slightest

forms of the disease. I cannot say that my own ex-
perience leads me to have any faith in the extracts
of belladonna or stramonium. In all cases it is
probable that the patient will derive advantage
from a careful mode of life, avoiding all irregu-
larities as to diet, and, as far as that is possible, all
unusual demands on the nervous system, whether
from mental exertion or anxiety.

If in the observations which I have now made
I have confined myself altogether to the constitu-
tional treatment of the facial neuralgia, it is because,
in truth, my experience leads me to have but
little faith in topical applications. Fomentations
and lotions, whatever their composition may have
been, have proved, when I had recourse to them,
wholly inefficient. I have been informed of a
case in which it was supposed that a belladonna
plaster had effected an immediate cure. When I
have made use of it, however, it certainly was
productive of no benefit whatever; and I am very
much inclined to believe that in the case to which
I have referred, it obtained credit which it did not
deserve, in consequence of a spontaneous abate-
ment of the symptoms.

In the present case, one of the first things which
I did was to direct that the part should be rubbed
with the veratrine ointment. This has been lately
proposed as a remedy possessing a most extra-
ordinary influence over a number of diseases,
neuralgic affections among the rest. I saw one
patient who thought himself relieved by it of a
pain in the forehead, connected with disease of the
frontal bone, in the neighbourhood of the frontal

branch of the fifth pair of nerves. I was, however, by no means satisfied that the relief really arose from the use of the ointment ; and in several other cases I have had recourse to it without the smallest advantage : however, there could be no objection to the use of it on this occasion, and I thought it worth while to make one experiment more ;—you have heard the result.*

Although I employed the veratrine ointment in this instance, I did so without any very strong expectations of success. In fact, the statement of its effects which had been published promised a great deal too much, and I should have expected more if it had promised less. I shall take this opportunity of observing, that I am not disposed to try indiscriminately all the new remedies which in these days are being constantly brought before society ; nor can I think well of this modern fashion of resorting on all occasions to novel methods of treatment. I advise you, if you wish to succeed in your profession, and to be useful to society, to pursue a different course. Make yourselves masters of the old remedies. Learn how to handle them, and what good they will do, and, as a general rule, have recourse to them in the first instance. If the old remedies fail, and you are at a loss as to what you should do, then, and not till then, have recourse to the new ones. If you always begin with new remedies, you throw away

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* At the time when this lecture was delivered I was not acquainted with the aconitine ointment prepared by Mr. Morson, of Southampton Row. I have now had recourse to it on many occasions, and have no doubt that the application of it in many instances will afford a temporary relief in cases of severe neuralgia.

the valuable results, not only of your own ex-
perience, but of the experience of those who have
gone before you.   You have to begin, as it were,
de novo ; and the first consequence of this will be
that you will not cure your patients ; and the
second, that you will have none to cure.   I should
be very sorry to see the march of science impeded
by an unjust apprehension of experiments and
innovations ; but, surely, there is a broad enough
line between a discreet and prudent use of new
remedies, and that indiscreet and hasty use of
them which we find to prevail at present in the
practice of our profession, and especially in that of
its junior members.

LECTURE XIV.

ON FATTY OR ADIPOSE TUMORS.

THERE are different kinds of fatty tumors, but the most common is the following. The fat resembles ordinary fat, except that it is rather of a more delicate and looser texture, and of a lighter colour. It is composed of lobules, having very thin membranes between them, and, externally, there is a very thin membranous bag in which the whole mass is contained. This bag has a very loose adhesion to the parts in which it is imbedded, but the adeps which it incloses adheres pretty firmly to it.

These tumors, for the most part, are situated under the integuments, in some part where there is naturally adipose structure. You do not find them *begin to exist* where there is no adeps, as in the loose cellular structure of the scrotum, or eyelids, or in the internal organs. But, wherever natural adipose structure exists, there this unnatural growth of adipose substance may take place. The tumor is often not even detected by the patient himself when of a small size, as it occasions no pain nor any other inconvenience. In some instances, after having attained a certain point, it remains for ever stationary; but for the most part it goes on gradually becoming larger. It

generally begins without any evident exciting
cause; but occasionally it may be traced to some
slight injury of the parts in which it is situated. For
example :—A gentleman, while straining to raise
his arm as high as he could felt a sort of snap
over his shoulder, and soon afterwards a fatty
tumor was discovered between the deltoid muscle
and the skin.   A lady, making some unusual effort
with her arm, experienced a similar sensation, and
soon afterwards a small fatty tumor showed itself
on the fore-part of the shoulder.   The diagnosis
of a fatty tumor is generally sufficiently simple.
There is a peculiar sensation communicated to the
fingers, which it is difficult to describe in words,
but which, having once felt it, you will readily
recognize afterwards.   Sometimes the tumor is
elastic, so that you might suspect it to contain
fluid.   You may every now and then be led into
this error, especially in the beginning of your
practice.   Experience will enable you to dis-
tinguish better; and at all events, where you are in
doubt, the introduction of a grooved needle will
settle the question for you.   The tumor is
generally well defined; it is neither painful nor
tender, and it causes the patient no inconvenience
except when of a large size, and then only from
its bulk.   There seem to be no limits to its
growth.   I am afraid to trust to my memory as
to the enormous size which such a tumor has
attained in some instances.

Although, as I have told you, the diagnosis is
generally easy, circumstances may occur to make
it difficult.   A lady had a tumor behind her

shoulder, and various opinions had been given as to its nature ; in performing the operation for its removal the trapezius muscle was found lying over it, and, on some fibres of the muscle being divided, out started a fatty tumor. As long ago as when I was a student, a lady had what appeared to be a tumor of the breast. She was the wife of a medical practitioner, and had the opinions of three or four of the leading surgeons of the day on her case. One thought that it was a case of *fungus hæmatodes;* another thought that it was something else ; and a third could give no opinion at all. At last it was decided to cut down on the tumor ; and on this being done it was found to be a great mass of fat. It had been situated under the gland of the breast, which, being of a large size, concealed the tumor completely, and, being lifted up by it, seemed itself to be enlarged. A gentleman had a tumor of the scrotum. Mr. Lawrence, Mr. Travers, Mr. Edwards, and myself, saw the patient in consultation. The tumor gave to the fingers the impression that would have been given by an omental hernia ; and it could be traced distinctly to the abdominal ring. It was quite distinct from the testicle, but lay behind it. We all found it easy to say what the disease was not, but no one of us could venture to say what it was. As, however, the tumor was certainly unconnected with the testicle, we agreed that it should be removed by the knife, and Mr. Lawrence performed the operation. It proved to be a common fatty tumor, which had had its origin in the adipose substance connected with the spermatic cord

within the abdominal ring, and which, as it increased in size, had made its way in that direction in which there was the least resistance, that is, into the loose cellular structure of the scrotum.

When a fatty tumor has a deep-seated origin beneath a muscle, a small portion of it will sometimes present itself, while the rest remains concealed ; and this circumstance, if it does not lead to any absolute difficulty as to diagnosis, will at any rate mislead you as to the extent of the disease. Very lately a patient consulted me respecting a tumor below the arm-pit. It seemed to be a common fatty tumor, of about half the size of an ordinary orange, but I could not pass my fingers behind it. It was plain that I could not trace it to its origin ; however, I made an incision on it, and then found an enormous tumor proceeding from the axilla. It extended from thence far backwards into the space between the scapula and the ribs. In fact, it was impossible to dissect out the whole of the tumor ; and I was under the necessity, having drawn out as much of it as I could, of applying a ligature round it, and removing that portion of it which was below the ligature with the knife, leaving the remainder where I found it.

As a fatty tumor increases in size, the skin becomes dilated in proportion. When it is of a large size, a thick fascia is formed over it, similar to that which is formed over a large hydrocele or hernia. In different parts of the fascia are circular spaces, into which the finger will penetrate, as if into the substance of the tumor. The skin over a fatty tumor very rarely inflames and

ulcerates. You might *à priori* expect that the pressure of the tumor would often produce this effect, but it is not so. I have, however, known inflammation to take place in the substance of the tumor, and an abscess to form in its centre. A very remarkable case of this kind was under my care in this hospital. An elderly man was admitted, with an enormous fatty tumor on his back between the shoulders, where it hung like a wallet. It had been growing there for a great number of years. A year or two before his admission there had been an attack of inflammation of the tumor, and an abscess had formed in it and burst externally. The abscess never healed, but continued to discharge profusely matter with an oily fluid floating in it. (It may be worth while for me to mention what happened afterwards in this case. I dissected off the tumor, which had a narrow base, so that the operation was a very slight one. The wound closed very rapidly, but when it was quite healed the patient became very ill. I have unfortunately no notes of the case, and I do not remember the precise symptoms, but I know that none of us at the time had any doubt that they arose from the sudden cessation of the profuse discharge of pus and oil from the abscess. The result, however, was that they subsided, and the patient recovered.)

We know of no internal medicine, nor of any local application, by which these tumors can be dispersed ; and the only remedy that we can offer to the patient is the removal of them by the knife. This may of course be done when the tumor is quite small. I do not, however, generally

recommend the operation at this period : *first*, be-
cause the tumor may never increase, and as long as
it is small it is of no consequence ; and, *secondly*,
because the operation is really more easy when the
tumor has reached a moderate size than it is at an
earlier period. Still it is desirable that the opera-
tion should not be deferred until the tumor is very
large, lest the pressure of the skin in its distended
state should cause adhesions to be formed between
the thin membrane in which the fatty substance is
enclosed and the neighbouring parts. Where such
adhesions exist the operation is comparatively
difficult, and there is always a danger of some
portion of the tumor being left behind. Under
ordinary circumstances the removal of the tumor
is, to those who understand the subject, one of the
simplest operations in surgery. Make a free inci-
sion, not *upon* the tumor, but fairly into its sub-
stance. Do not spare the incision of the skin, but
let it extend from one end of the tumor to the
other. Then lay aside the knife, and you will find
that you can easily detach the tumor, cyst, and
all, from the neighbouring textures, drawing out
one lobe after another, until you find at last an
attachment at one corner, where the vessels enter.
Here the knife is again required, and there are
generally one or two arteries to be secured by the
ligature. There is for the most part no bleeding
in any other part of the operation. When the
tumor is situated under a muscle the operation
is to be performed in the same manner, except
that the muscle must be freely divided across its
fibres in the first instance.

There is another kind of fatty tumor which occurs occasionally, but which has not been, as far as I know, described by surgical writers. In the cases to which I allude the tumor is not well defined ; in fact there is no distinct boundary to it, and you cannot say where the natural adipose structure ends and the morbid growth begins. I will relate to you the history of one of several cases of this kind that I have met with, and this will explain as much as I know of the matter. A man came to this hospital several years ago having a very grotesque appearance ; there being an enormous double chin (as it is called) hanging nearly down to the sternum, and an immense swelling also on the back of his neck formed by two large masses, one behind each ear, as large as an orange, and connected by a smaller mass between them. He said that the enlargement had begun to show itself three or four years before, and had been increasing ever since. They gave him no pain ; nevertheless they made him miserable, and in fact had ruined him. The poor fellow was by occupation a gentleman's servant, and having so strange an appearance no one would take him into his service I gave him half a drachm of the *liquor potassæ* three times daily, and gradually increased the dose to a drachm, dissolved in small beer. When he had taken the medicine for about a month the tumors were sensibly diminished in size. He went on taking the alkali, and the tumors continued to decrease. It was just then that iodine began to have a reputation, much indeed beyond experience has proved it

to deserve, for the cure of morbid growths, and I left off the *liquor potassæ*, and prescribed the tincture of iodine instead. The effect of this change of treatment was remarkable. The patient lost flesh, while the tumors increased in size. Of course I omitted the iodine, and prescribed the *liquor potassæ* a second time. Altogether he took a very large quantity of the latter medicine, and left the hospital very much improved, with directions that he should continue to take it with occasional intermissions. I had lost sight of him for some time, when it happened that I was requested to visit a patient in Mortimer Street. I did not observe the servant who opened the door, but as I was leaving the house he stopped me, saying that he wished to thank me for what I had done for him. It was this very patient. He was so much improved in appearance that he was enabled to obtain a situation as a footman. There were still some remains of the tumors, but nothing that was very remarkable. I have seen some other cases of the same kind, in which the exhibition of very large doses of the *liquor potassæ* appeared to be of great service. But I have not had the opportunity of trying it, or of knowing the results in every case; and I am informed that in some cases it has been given to a considerable extent without manifest advantage.

These tumors feel like fat; but they may be distinguished from common fatty tumors by their having no well-defined boundary, and by their being less soft and elastic. Such deposits may probably take place in any part of the body; but I

have seen them more frequently in the neck than anywhere else.

There is another kind of tumor, which, for reasons which you will see presently, I am led to take this opportunity of mentioning. These also, as far as I know, are not described by surgical writers. A patient applies to you with tumors in various parts of his person. They are situated in the subcutaneous adeps, give no pain, and are not tender to the touch ; they have a well-defined margin, and are of a somewhat firmer consistence than common fatty tumors, to which, in other respects, they bear a great resemblance. They grow to a certain point, then remain stationary, while others show themselves elsewhere ; until, at last, there is no part of the trunk or extremities in which they are not to be met with, varying in size from that of a pea to that of a small walnut. They occur in persons who are otherwise in good health, and do not seem to be connected with any other disease. I have never known them to ulcerate or assume the character of a malignant disease. I used to doubt what these tumors were, although their general character led me to suspect that they were a modification of fatty tumors. At last, in a patient who had several of them, there was one, which, from its unusually large size, caused some degree of inconvenience ; so that it seemed advisable to remove it by the knife. On examination, I found it to have the appearance of fatty matter, blended with a larger proportion of a condensed cellular membrane than is observed in the common fatty tumor. I regret that I missed

the opportunity of having it examined, either microscopically or chemically.

Any one of these tumors that attains an unusually large size may be removed with the knife; but there being in general a great number of them, it would be absurd to think of removing the whole in this manner. Can any thing be done in the way of medicine? I have given to these patients that which I recommended for the cases which I described last, namely, the *liquor potassæ*, in large doses; and, certainly, as far as I have yet tried it, it has appeared to be of service. Indeed, in one case, the tumors nearly or quite disappeared under its use.

It seems probable that in cases of fatty deposits the *liquor potassæ* operates in the following manner: the oily part of the tumor combines with the alkali, is taken into the circulation, and thus carried off. It was upon this hypothesis, at any rate, that I was first led to adopt this mode of treatment; and it seems to me that the success of it is sufficient to justify the hypothesis. But may the *liquor potassæ* be taken in such large doses with impunity? I have no reason to believe that it may not, provided that it be sufficiently diluted. You cannot take more than half a drachm in two ounces of liquid without some inconvenience to the stomach; but you may take a drachm and a half in a large quantity of liquid twice or thrice daily without harm. The best liquid for it to be taken in is fresh small beer. It seems to me to act better when given in this, than when given in any other liquid; and the beer does not disagree with the stomach,

because the alkali neutralizes every drop of vinegar which it contains. Perhaps the diuretic salt which is formed by this combination is advantageous; but, besides this, the alkali is less ungrateful to the taste when taken in beer than when taken in any other vehicle. However, there are some persons with whom malt liquor really disagrees, even when an alkali is added to it, and there are others who cannot be persuaded that it does not do so; and then milk and water, clove tea, ginger tea, or veal broth may be substituted for it. Under these circumstances, however, the alkali should be exhibited in somewhat smaller doses than when dissolved in beer, as none of it is neutralized.

There is another remarkable kind of fatty tumor, which is, however, of very rare occurrence. A young gentleman had three or four tumors in different parts of his person, which resembled common fatty tumors, except that they were of a firmer consistence His friends wished that they should be removed. In performing the operation, I found them to be composed of a rather dense fat, covered by a reflected membrane, not less perfect than the peritonæum or pleura, or any other reflected membrane of original formation. There was one layer covering the tumor itself, except at one point, where it was attached to the adeps in the neighbourhood; and there was another layer, forming a loose bag, in which the tumor seemed to be pendulous, and which was moistened by a halitus. How you are to distinguish these tumors from other fatty tumors previously to an operation, I do not know.

There is a tumor of common occurrence in connection with the female breast, which was, I believe, first described by Sir Astley Cooper, and to which he has given the name of chronic mammary tumor. It is not a very good name, but I know of no other. This tumor is of a peculiar structure; generally lobulated; and when you examine one lobule you find it composed of smaller lobules still, all adhering to each other by a loose cellular texture. It occurs, for the most part, in young women. I was called to see a young lady some years ago who had a tumor on one side of her breast, which seemed to be of this description; and I removed it by an operation. When I examined the tumor afterwards, I found that, although it had much of the appearance of the chronic mammary tumor, it bore considerable resemblance to a fatty tumor also; that is, it contained a good deal of fatty matter. This case called my attention to the subject; and, since then, other cases have occurred which lead me to suspect that the fatty tumor and the chronic mammary tumor stand in a certain degree of relationship to each other; the structure being probably modified by the peculiar organization of the part in which the disease is situated.

In the case which I have just mentioned the character of the fatty tumor predominated; but I have seen other tumors in which the same character existed, but to a less extent; and even where the characters of the two diseases are most distinctly marked, there is this point of resemblance between them: the adhesion of them to the neighbouring

parts is of the same kind, and they are to be re-
moved in the same manner; namely, by dividing
the skin, and making an incision into the sub-
stance of the tumor, then turning it out with the
fingers, and not in general using the knife again,
except at one point, where a more complete adhesion
to the neighbouring parts indicates the entrance of
some small arteries.

In confirmation of this view of the relationship
of these two classes of tumors to each other, I
may mention the following case: A lady had an
enormous tumor of the breast. It did not feel very
different from the natural breast, but it seemed like
a breast of a monstrous size. Sir Astley Cooper
saw the patient with me. There is such a disease
as hypertrophy of the breast; that is, a morbid
increase of the gland, without any actual alteration
of structure; and both Sir Astley and myself were
inclined to believe that such was the nature of the
disease in this instance. The tumor continued to
grow; the patient became tired of carrying it
about, and we recommended her to have it re-
moved. Sir Astley Cooper was present at the
operation, and we set about it, believing that I
should remove the whole breast. When, however,
I had made the first incision, I found that the
breast lay perfectly sound in front, expanded over
the surface of a large tumor which was situated
between it and the pectoral muscle. The first
portion of the tumor which I exposed had the
appearance of the chronic mammary tumor; then I
came to a mass of fat; then to the other structure
again. In short there was a fatty tumor and a

chronic mammary tumor blended with each other. The entire mass probably weighed between two and three pounds. The patient recovered; and up to this time, that is, at the end of seven years, there has been no recurrence of the disease.

It was the opinion of Sir Astley Cooper that a fatty tumor will sometimes take on the action of a malignant disease, and become a malignant tumor. Whether this opinion was founded on dissections I do not know, but it probably was so; at all events I have no doubt that he had seen cases in living persons (from which, great as the advantages arising from morbid anatomy are, the best part of pathology is to be learned,) which justified this opinion; and in confirmation of it I may mention the following case. A farmer from a distant part of the country applied to me on account of what seemed to be a fatty tumor in the back. It was as big as your two fists put together, and had existed for a long time. There seemed to be no reason to doubt that it was a fatty tumor; yet it was a little firmer in its consistence than such tumors generally are. I removed the tumor by an operation, and, on making an incision into it afterwards, I found that it was composed of what seemed to be fatty substance, somewhat more condensed than usual; but that, here and there, dispersed throughout the mass, there was another kind of morbid growth, apparently belonging to the class of medullary or fungoid disease. It is reasonable to suppose, that if this tumor had been allowed to remain, it would have ulcerated, and run the usual course of a malignant disease.

LECTURE XV.

ON MORTIFICATION.

A PART of the animal body may lose its vitality, while the rest continues to live. We say, then, that it is mortified, and the process by which this change is brought about we call mortification or sphacelus. The term gangrene properly signifies the commencement of mortification, or that condition of the affected part which immediately precedes mortification. But it is somewhat loosely employed, and not unfrequently is used as synonymous with mortification and sphacelus. This change, by which a living organ returns to the state of dead matter, viewed in connection with the changes by which it is preceded and those which follow it, is one of the most interesting subjects in the whole science of pathology; the treatment to be employed on these occasions forms one of the most important inquiries belonging to practical surgery; and I am sure that you will not think your time ill bestowed if I call your attention to these matters in this and the following lectures.

The causes of mortification, as I shall explain to you hereafter, are various. If the part affected be one immediately concerned in the vital func-

tions, the death of the entire animal is a speedy, if not an immediate, consequence. If the part affected be one not directly necessary to life, still, if mortification exist to a very considerable extent, so great an impression will be made on the whole system that the same result will probably ensue. Otherwise, after a certain period of time, another process becomes established, by which the dead part is separated or thrown off from the living. We distinguish this process, when it occurs in soft parts, by the appellation of sloughing, and the part separated is called a slough. When, however, it occurs in hard parts, as in the bones or cartilages, we call it the process of exfoliation.

Sloughing and exfoliation are accomplished by ulceration of the living parts in contact with the dead. A thin layer of the living parts is absorbed, and the dead part is left lying loose on the ulcerated surface.

The period of time required for the completion of the process of mortification differs according to the circumstances under which the mortification takes place. It may be very slow; it may be rapid; it may be almost instantaneous; as I shall explain to you more fully hereafter. The period required for the completion of the after-process of sloughing varies also: *First*, according to the state of the system, and the activity of the vital powers generally: *Secondly*, according to the organization of the part in which the disease occurs; (thus, other circumstances being the same, the sloughing of the skin is much sooner accomplished than that of tendon, or than the exfoliation

of bone) : *Thirdly*, according to the state of the neighbouring living parts, without reference to that of the general system ; thus, if there be much inflammation in them, the ulcerative process proceeds more rapidly than when the inflammation is very slight : and, *Lastly*, as long as the mortification continues to spread there never is, and for obvious reasons cannot be, even the commencement of the process of separation. I have seen mortification begin in an old man's toe, and be gradually spreading, even for months, up the foot and leg, without the least appearance of a line of demarcation, or the least attempt at sloughing. In the same manner, a piece of dead bone may continue adherent to the living bone even for some years. If the disease on which the death of the bone depends can be arrested, as it sometimes can (by mercury, for example, or by sarsaparilla), the exfoliating process begins immediately, and when begun it is completed as soon as under ordinary circumstances.

The separation of the dead part is followed by another series of changes, which terminate in healing, or cicatrization. But these changes are not at all different from those which occur when there is a loss of substance in other ways, and it is not my intention, therefore, to enter into the consideration of them at present.

Having offered these general observations on the subject, I shall proceed to consider the various circumstances under which mortification may take place, and the treatment which it requires, accordingly as it arises from one cause or from another.

Mortification from Inflammation.

Mortification is described as one mode in which inflammation terminates. A very intense degree of inflammation may lead to this result in any structure, or in any constitution ; but a moderate degree of inflammation may lead to it also in particular cases. Inflammation of cellular membrane terminates in mortification more readily than inflammation of the skin ; and in persons of bad constitution the cellular membrane is more likely to mortify than it is in others. You see examples of this over and over again in the cases of the diffuse cellular inflammation which occurs in dram-drinkers. A small puncture of the leg, or a compound fracture, in which the injury is apparently trifling, may cause inflammation extending gradually from the foot to the buttock ; and the whole cellular membrane may in the course of a few days become a putrid slough. I have seen a case in which a patient became affected in this manner from a leech bite ; and another in which a similar mischief followed the sting of a bee ; and both these patients died. From what has since fallen under my observation, I have little doubt that they were both dram-drinkers, though I was not sufficiently acquainted with the subject to have my attention directed to it at the time. In the case of the man stung by the bee, however, something may perhaps be attributable to the operation of the animal poison ; and I shall revert to this point hereafter. I once lost a patient with diffuse cellular inflammation ending in mortification after the

simple operation of castration; and I was disposed to attribute this unfortunate result, in a great degree at least, to the operation having been performed immediately after a long course of the tincture of iodine.

If inflammation of the skin terminates in mortification independently of any antecedent inflammation and mortification of the cellular membrane beneath, the inflammation is usually intense, the surface of the skin is of a dark red colour, and there is severe pain and tenderness. As the inflammation advances the skin assumes a livid appearance; a serous fluid is thrown out under the cuticle, which is thus elevated in the form of blisters, and then the skin itself perishes. If the mortification takes place to any great extent, the general system suffers. The pulse is feeble, irregular, intermitting; the countenance is anxious; the skin becomes cold; there is an utter incapability of exertion; and after a few days, and sometimes sooner, the patient dies. If the constitution does not suffer in this manner, or if the patient survives the shock, after a few days the separation of the slough begins to take place, and this is the first step towards a complete recovery.

In cases of diffuse cellular inflammation, the occurrence of mortification is preceded by an abundant infiltration of serum. In some instances the serum is of a peculiar yellow colour, and the skin over the whole body, and the *tunicæ conjunctivæ* of the eyes, may assume the same appearance. I do not know to what cause this

yellow tinge is to be attributed. The patient looks as if he were jaundiced, but he is not so in reality, for there is no bile in the urine. When mortification of the cellular membrane has begun to take place, the constitution suffers in the manner which I have just described in speaking of mortification of the integuments. If the patient survives the shock, or lives for some time under it, the mortification of the cellular membrane is invariably followed by mortification of the skin over it to a greater or less extent.

Allowing for the difference of function in the affected organs, the foregoing description will apply pretty nearly to all cases in which inflammation of the soft parts terminates in mortification. If there be mortification of the intestine, there is an effusion of dark-coloured serum into the abdominal cavity. Whenever the part which mortifies is situated internally, so that the putrid serum formed round the slough cannot escape, the constitution suffers much more than where it is situated externally, and especially an intermitting pulse and hic-cough are often added to the other symptoms. Probably these more aggravated symptoms are to be attributed to the exhalations from the pent up putrid matter being in part absorbed into the circulation. I shall mention some circumstances hereafter which seem to favour this opinion.

It forms an interesting subject of inquiry, How is it that inflammation terminates in mortification; or what is the pathological explanation of this phenomenon? And this leads us to the question as

to the nature of inflammation itself. Mr. Hunter describes it as consisting in an increased action of the small blood-vessels. If increased action be indicated by a greater degree of contractility in the coats of the vessels, the theory is evidently wrong ; for microscopic examination proves that there is no such thing. But, in fact, this is not what Hunter meant ; and in another sense of the words he is clearly right ; for the vessels of an inflamed part secrete serum, lymph, and pus, and build up new structures ; in short, they do many things which they do not do under ordinary circumstances ; and all this affords an abundant evidence of increased action. Another theory of inflammation, which has been of late promulgated in opposition to that of Hunter, is that the essential part of it is a debility, or a weakened state of the capillaries ; and the propounders of this theory refer to the dilatation of these vessels in proof of it. But I own that I can discover no reason to believe that the dilated state of the capillaries proves any thing, except that there is something in the condition of an inflamed part which makes a greater supply of arterial blood necessary, and that these vessels have the power of adapting themselves to these new circumstances. Nor is this power limited to the capillaries. It exists in the arterial trunks, in which the capillaries have their origin. Thus, in an animal killed by arsenic, in whom the poison produces extensive inflammation of the mucous membrane of the stomach and intestines, the branches of the mesenteric arteries are seen dilated to double their

natural diameter. In like manner, when muscles are in exercise, or when a gland is pouring forth an abundant secretion, the capillaries become dilated so as to admit the increased quantity of blood which, in consequence of the greater activity of the organ, is required ; but no one pretends to say that they are therefore in a state of debility ; and I see no difference, in this respect, between these cases and that of inflammation. But microscopic examination proves something more than the mere dilatation of the capillaries. " The blood " itself is affected. It loses its globular structure ; " and, previously to this, the globules themselves " are observed to have lost their repulsive proper- " ties, and either to agglomerate together or to " adhere to the sides of the vessel in which they " are contained, and not unfrequently they seem to " stagnate, so as to choke up the vessel altogether, " and destroy the circulation in it." Now if this happens in many of the capillaries it is plain that the vitality of the part cannot be maintained, and thus the occurrence of mortification is easily explained. Other circumstances, however, may continue to produce the same result. For example, let us suppose a case of inflammation of the cellular tissue of the scrotum. The cells are filled with serum. They are fully distended, and the skin is on the stretch. If nothing be done to the part, the cellular membrane first, and the skin after- wards, will mortify to a great extent ; but make a few incisions with the point of a lancet, serum escapes in sufficient quantity to relieve the tension, and the mortification is in great measure,

or perhaps wholly, prevented. It is reasonable to suppose, that, in consequence of the extreme distension, the fluid in the cellular membrane causes so much pressure on the vessels which supply the skin as to impede the passage of the blood through them, and that the punctures of the scrotum and the escape of the serum prevent the mischief which would otherwise have ensued, merely by removing the pressure. When a common abscess opens, as it sometimes does by mortification and sloughing of a portion of the skin over it, we are not to regard the mortification as the mere result of inflammation, any more than in the case which I have just stated. The ulcerative process going on under the skin destroys a portion of the vessels by which the skin is supplied ; the pressure of the matter prevents the free passage of the blood through those which remain ; and thus a due supply of blood being prevented, the skin perishes.

Treatment of Cases in which Inflammation terminates in Mortification.

Whatever tends to lessen the violence of the inflammation, ought to prevent, or check, the progress of the mortification ; and, on these grounds, it may be expected that the patient will derive benefit from the abstraction of blood.

But, on the other hand, the abstraction of the blood, by which the life of a part is supported, if carried beyond a certain point, is of itself an adequate cause of mortification ; and the abstraction of even

a small quantity of blood may lead to this result under certain circumstances.

It is not by a reference to principles alone that you can learn how you should act in this dilemma. Experience is our safest guidance; and on this, as on many other occasions, the practical surgeon will have a great advantage over the mere scientific pathologist.

If the inflammation be intense, if the pulse be strong and full, the countenance flushed, and the skin hot,—that is, if there be marks of great general excitement of the system, it is probable that the patient will derive benefit from blood-letting; and if you have reason to believe that he is of what may be called a robust or even a sound constitution, blood may be drawn to a considerable extent, and the blood-letting may be repeated. I have adopted this practice under these circumstances, not only where the appearance of the parts was such as to indicate that mortification was impending, but where it had actually begun; and have had the satisfaction on several occasions of seeing the progress of the mortification immediately suspended. You will have no better opportunity of watching the beneficial results of such a mode of treatment than in some cases of sloughing sores or chancres on the *glans penis*. While you administer opium and stimulants the marginal inflammation increases, and the slough continues to extend;—take some blood from the arm, the inflammation becomes abated, and the progress of the slough is suspended. Repeat the blood-letting, and the sore

assumes in a short time a healthy aspect. In such cases I have known nature accomplish what was wanted, while a timid surgeon was doubting how to act. There has been a spontaneous hæmorrhage ; the patient has lost half a pint, or even a pint, of blood. Immediately, the pain, the tension of the surrounding part, the redness, and the general excitement have been relieved, and in the course of a week the sloughs have separated, and the sore has become covered with healthy granulations.

But there are other cases in which blood-letting would be as mischievous as it is useful under the circumstances which I have just described.

Let us suppose a patient who has been a dram-drinker ; or who, belonging to the more affluent classes of society, has indulged in too copious libations of wine ; or whose constitution has been otherwise impaired ; and that he has received some injury of the leg, followed by diffuse inflammation, which threatens to terminate in sloughing of the cellular membrane, and afterwards of the skin ; or that after such an injury mortification of these textures has already begun ; let us suppose, also, that, although inflammation is spreading rapidly, there are signs of debility, the pulse being small and feeble, and the countenance expressive of anxiety : now, if, under these circumstances, you abstract even a moderate quantity of blood, it is probable that you will hasten the progress of the local mischief ; and if blood-letting be employed to a considerable extent, it will certainly destroy what little chance there might otherwise have been

of the patient's recovery. Let us suppose another case. There is a chancre or other sore on the penis. It is surrounded by a languid inflammation; the neighbouring parts are gradually assuming a dark livid appearance, the pulse is small and quick, with no inflammatory excitement of the general system: under these circumstances, also, the abstraction of blood, instead of checking, will cause a more rapid progress of the disease.

It is highly important that you should learn to distinguish these two classes of cases from each other; and in a great number of them you will have no difficulty in doing so. You cannot, however, draw any exact line between them; and cases will occur in practice, in which you will not be able to determine, in the first instance, which is the proper course for you to pursue. Here you must proceed cautiously, watching daily the operation of the remedies which you employ, and persevering in one mode of treatment, or adopting another, according to the effect produced; and sometimes it may be right to take away a moderate quantity of blood in the first instance, and to have recourse to an opposite mode of treatment almost directly afterwards.

In order that I might bring the subject before you in the simplest form, I have hitherto referred merely to the question of blood-letting. But, of course, this involves much other treatment. Where blood-letting is proper, active purgatives will be proper also, as well as saline and diaphoretic medicines; and every thing in the shape of stimulating liquors and food should be avoided. Where blood-

letting, on the other hand, is improper, though
aperient medicine may be required, very active
purgatives should be avoided : the patient should
be allowed such diet as his stomach is capable of
digesting ; and he should have wine or ale, or even
brandy or gin ; the quality, as well as the quantity
of the stimulus varying according to the character
of the symptoms, and his previous habits. I say
his previous habits, for it is essential that you
should always inquire what these have been, and
act accordingly. It is rarely safe to deprive a
dram-drinker for any considerable time altogether
of his usual stimulus ; and the effect of a judicious
exhibition of it is very remarkable, not only in
arresting the progress of mortification, but in
abating the violence of the inflammation which
leads to it. Decoction of bark, quinine, and other
tonics, may be useful under certain circumstances ;
but I must say that the longer I live, and the
more I see of these cases, the less is my faith in
such remedies, while inflammation and mortification
are going one ; and I am satisfied that they often
do great harm, by loading the stomach, and inter-
fering with the digestion of food. At a later
period, however, when the progress of the mortifi-
cation is stopped, and the sloughs are beginning to
separate, I have no doubt that they are eminently
useful. The repeated trials which I have made,
and seen made, of ammonia have not left on my
mind any more favourable impressions of this
remedy than those which I entertain of bark and
quinine. It is a temporary stimulus ; but alcohol,
prudently administered, is much better ; and my

observations lead me to suspect that large doses of ammonia, if persevered in for a considerable time, tend to depress the vital powers, and lessen the chances of recovery. Opium is useful under certain circumstances ; as where there is severe pain, or where the inflammation and mortification depend on the operation of a specific poison.

I have already had occasion (with a view to explain the pathological phenomena of mortification) to advert to the effects of incisions made through the skin into the cellular membrane, when the cells of the latter are exceedingly distended with serum. Whether the explanation which I then ventured to offer of the mode in which this serous infiltration operates in producing mortification be or be not correct, there can be no doubt that the evacuation of the serum, and the consequent relief of tension, will go far towards preventing an extensive mortification in all cases, and will prevent it altogether in a great many. It is not, however, always necessary for this purpose that we should make scarifications or incisions. Mere acupunctures are not unfrequently sufficient. I have, on many occasions, requested the house surgeon of this hospital to make punctures where this serous infiltration of the cellular membrane was going on, every morning and evening, or whenever he found occasion to do so ; and it often has happened that nothing more was required. But, of course, this simple practice is useful only in an early stage of the disease,—where there is that state of things which may lead to mortification, but where mortification has not actually taken place. Where sloughs of the

cellular membrane have begun to form, or where an infiltration of pus has begun to follow the infiltration of serum, mere punctures will be insufficient. Incisions or scarifications will then be required; and they should be of sufficient extent to allow the serum and pus to escape freely, and to relieve the tension of the skin. But they should not be more than this : *first*, because such painful operations are a great shock to the nervous system of a person in vigorous health, and a very great one indeed to one who is weakened by previous diseases ; (and it is to be observed that this shock is not given to the system once for all, as, if the inflammation spreads, it may be necessary that the incisions should be repeated) ; *secondly*, because in proportion to the extent and depth of the incisions, is the danger of hæmorrhage, the occurrence of which, to any considerable extent, is sufficient to prevent the patient's recovery. In making the incisions, you should always bear in mind that it is of vital importance that there should be as little hæmorrhage as possible ; and here you will find the advantage of having some active and intelligent assistants, who will carefully watch your lancet or scalpel, and whenever they see a vessel beginning to bleed, make pressure with the finger on it. Ligatures may be sometimes required, but not in general. The divided vessels, under these circumstances, bleed most profusely in the first instance, but they soon contract ; and the pressure of the finger for a few minutes is usually sufficient to stop the hæmorrhage altogether.

The foregoing observations apply to all cases

in which inflammation of cellular membrane has already begun to terminate in gangrene, or threatens to do so, whether the inflammation be phlegmonous or erysipelatous, or that peculiar variety of inflammation which produces carbuncle. The effect of scarifications in preventing the further progress of mortification of the skin in all these cases is very remarkable; but, under certain circumstances, they produce a still greater benefit to the patient. Whenever putrid matter is pent up round a slough of the cellular membrane, the system is poisoned by it. The sulphuretted and carburetted hydrogen gas evolved during the decomposition of dead animal matter, seem to pass, in part at least, into the circulation, producing the most dangerous symptoms. The incisions which relieve the tension of the skin allow these noxious gases to escape, and the relief which this affords to the patient is very remarkable. I might, if it were necessary, enumerate a great number of cases in illustration of what I have just observed. One, however, will be sufficient; and this I am tempted to relate, because the case is in itself of great interest, and also because a particular instance may serve to impress the rule more on your minds than a mere general observation. I was called, some few years since, to see a gentleman, who appeared to be actually on the point of death. His extremities were cold; his pulse barely perceptible. It was doubtful whether he was sensible or not. He made, on being roused, several imperfect attempts to speak, but could say nothing intelligible. Below the right hypochondrium there was a considerable

tumor, the skin being of a dark red colour, on the verge of mortification. On examination with the fingers, I perceived a sort of emphysematous crackling, and an imperfect fluctuation. Having made a free incision, I discovered, underneath the discoloured skin, what might be called a quagmire of slough. A small quantity of putrid matter escaped; but there escaped also such a quantity of noisome and offensive gas, apparently sulphuretted hydrogen, that I could scarcely bear to remain in the room. The stench pervaded the whole house, and even could be perceived in the garden round it. Within two minutes after the performance of this operation, so trifling in appearance, but so important in reality, the patient looked up, and said, quite distinctly, "What is that you have "done which has made so great a difference in my "feelings?" At the same time the pulse returned at the wrist; and from this moment, he recovered, without any further unfavourable symptoms. After a few days sloughs came away, probably of muscle, cellular membrane, and peritonæum, in a confused mass, and, with them, a gallstone of moderate size; explaining, to a certain extent, at least, the origin of the disease.

The cases in which you will most frequently have occasion to resort to the employment of scarification are those of diffuse cellular inflammation of the extremities, whether it be phlegmonous or erysipelatous. But there is another class of cases, which occur after injuries, and often after slight injuries, of the scalp, in which the same treatment will be required; to which, before I

conclude this present lecture, I am tempted to draw your attention : both because they will serve to illustrate the observations which I have already made : and, because the disease is one with which you ought to be made acquainted, but which, as far as I know, has not been distinctly described by surgical writers. Here, as in cases of erysipelas of the skin, there is a rigor followed by an attack of fever preceding the local symptoms. The latter show themselves in the form of pain in the neighbourhood of the wound or contusion, and an œdematous swelling of the scalp, without any redness of the skin. The swelling pits on pressure. It spreads over the whole scalp to the forehead, and sometimes over the whole face, the skin still retaining its natural colour, or even appearing paler than natural. The progress of the swelling is accompanied by pain in the head, and a continuance of febrile symptoms. In some cases, the disease, after having continued for ten, or twelve, or perhaps fourteen days, begins to sub-side ; the serum which caused the œdematous swelling being gradually absorbed without any further mischief. In other cases, suppuration takes place underneath the scalp, with extensive sloughing of the cellular membrane, and this is followed by sloughing, not only of the scalp above, but of the pericranium underneath. I have known the latter destroyed to such an extent as to lay bare a large portion of the bone of the cranium. If you would prevent all this great mischief, you must by one method or another relieve the tension caused by the œdematous effusion into the cellular

membrane. Simple acupunctures are generally sufficient for this purpose, provided that they are made at an early period, and repeated once or twice daily for several successive days. Where a sufficient quantity of the serum does not escape by the punctures, or sloughs of the cellular membrane have already begun to form, larger openings are required, and incisions must be made, through the scalp and the subjacent textures, quite down to the cranium. These must be repeated from time to time, as the disease extends from one part of the scalp to another. The appearances observed, when these incisions are made, explain, in some degree, the seat and nature of the disease. There is a slight effusion of serum immediately underneath the scalp; but the great effusion, and that on which the tumefaction chiefly depends, is underneath the tendon of the occipito-frontalis muscle; and here the effusion is in some instances so extensive, that I have known the tendon to be separated as much as half an inch, or even more, from the pericranium. A large quantity of serum escapes immediately on the incision being made; the tension is of course relieved, and the destruction of the parts is prevented. I suspect this disease to be a modification of erysipelas. The symptoms are nearly similar, except that there is no redness of the skin, which, indeed, usually appears to be paler than usual. In confirmation of this opinion, I may mention that in a few instances, the true erysipelatous character is exhibited as soon as the inflammation has extended from the scalp to the face. The disease is not

arrested by blood-letting, or by what are commonly called antiphlogistic remedies. It occurs in persons of a debilitated habit, and requires almost from the beginning an opposite mode of treatment. Such nourishment should be administered as the stomach will bear, with wine or porter; and where the tongue is clear and moist the decoction of cinchona may be given with advantage.

———————

Let us now suppose that mortification has taken place to a certain extent; that the progress of it is arrested; and that the system survives the shock;—What further local treatment is required?

Indeed, I have little faith in any. The separation of the slough is a natural process. It is usual to employ stimulating, or, as they are called, digestive ointments: solution of chloride of soda; stale beer poultice; and other applications of the same kind. But my own experience would lead me to believe that the process of separation will go on just as fast with the simplest treatment, such as that of bread-and-water poultice, or a linseed poultice, or wet lint with a piece of oiled silk over it. The constitutional treatment, at any rate, is of much more importance than any topical applications. Tonics may at this period be given with advantage; but the discreet administration of wine and a nourishing diet is of more importance still. Of course no general rule can be laid down. You must study the existing symptoms, and act accordingly.

LECTURE XVI.

ON MORTIFICATION—*continued.*

Mortification from Ligature.

I now call your attention to some other varieties of mortification.

A ligature drawn round any part of the body, so as to intercept the communication with the great vessels and the heart, may cause that part to perish. But the effect of the ligature is not the same in all cases; and it does not always produce mortification in the same way. You apply a bandage round the arm before you bleed a patient, to make the veins of the fore-arm become distended, the object being merely to impede the circulation in the superficial veins. If you take it off at the end of a few minutes, the hand is at once just as it was before the ligature was applied. If you were to leave it on twelve hours, the whole hand and fore-arm would become swollen, and would remain swollen for some time after the bandage was removed. The swelling in such a case arises from the congested state of the veins, and from the consequent effusion of the serum of the blood into the cellular membrane. The first effect, then, of a ligature which obstructs the circulation without arresting it completely, is to

produce serous infiltration of the cellular membrane, and an œdematous swelling. The different kinds of dropsy depend on the same principle. Disease in the heart, impeding the circulation through it, gives rise to anasarca of the legs and dropsy of the pericardium and pleura. Disease of the liver, by obstructing the circulation through the *vena portæ*, produces dropsy of the peritonœum.

But let us suppose that a ligature applied in this manner round the arm, were allowed to remain, so that the impediment to the circulation continues. A low sort of inflammation would set up, the œdematous swelling and the tension would be aggravated, and might terminate in mortification.

This is one kind of mortification from ligature. But let us suppose that the ligature is drawn tighter still ; that it completely intercepts, not only the venous, but the arterial circulation. It is evident that the part below the ligature, being altogether deprived of that supply of scarlet blood which is necessary to the maintenance of vitality, must lose its vitality ; and this, then, is another way in which a ligature produces mortification.

In the course of your practice you will meet with numerous cases illustrative of the different effects of ligature according to the degree of constriction which they occasion. Thus, a woman has a femoral hernia ; a large portion of intestine is protruded through the narrow crural ring in the act of coughing ; the ligature is as tight as possible. Strangulation is complete. The arterial circulation, as well as the venous, is wholly obstructed. If you perform the operation for

strangulated hernia on such a patient, even in half an hour, you may find the intestine dead. But if (as generally happens) the degree of constriction be less in consequence of the opening being of larger size, or the protruded intestine being smaller in quantity, then the venous circulation is obstructed more than the arterial; there is no mortification immediately; there is venous congestion followed by inflammation, which may end in mortification in the course of two or three days, or, perhaps, not until after the lapse of a longer period. A man has a phimosis. He pulls back the præpuce, and the orifice becomes a stricture behind the *corona glandis*. There is venous congestion; the gland is swollen, assumes a purple colour, then becomes inflamed, and the inflammation is followed by mortification. Again, a patient has internal piles; they protrude at the anus; the sphincter muscle acts spasmodically upon them; they cannot be pushed back through the sphincter; the return of venous blood is prevented; they swell, inflame, and, in the course of a few days, they mortify. By and by the slough drops off, and the disease is cured.

You will now understand the principle which ought to be kept in view, when we use ligatures in surgical operations. You treat internal piles by the application of a ligature. If you draw the ligature only moderately tight you do not kill them at once; they swell; they inflame; they may die at last, but by a painful and tedious process. If, however, the ligature be drawn as tight as possible, it stops the flow of the arterial

as well as of the venous blood, and the piles die
directly.   This is the way in which a ligature
should be applied in almost all cases in which
you have recourse to it as a means of cure ; it
should be drawn as tight as possible.   In dealing
with piles, or nævi, or tumors of the tongue, the
strangulation made by the ligature should be com-
plete, otherwise not only are the sufferings of the
patient aggravated, but it may happen that severe
constitutional disturbance will ensue.

I have said that when you apply a ligature in a
surgical operation, your object should be to stop
the flow of arterial blood at once ; and you might
suppose that if the ligature were kept on for half
an hour, or an hour, that this would be sufficient ;
that the part being deprived of the flow of arterial
blood for such a time it would certainly lose its
vitality.   But this is not exactly the case.   You
apply a ligature round an artery, draw it as tight
as is possible ; it divides the middle and inner
coats, but only compresses the outer coat.   It
makes a slough of a little piece of the latter ; and
when the ligature comes away at the end of ten
days or a fortnight, you find the slough in it.
But if you cut off the ligature in half an hour, or
an hour,—an experiment which has frequently
been made,—there is no slough.   The artery may
be obliterated, or it may not, by the effusion of
lymph ; but the piece of the outer coat that was
included in the ligature recovers itself ; at least we
do not find that it comes away as a slough.   I had
a patient with a malignant tumor of the tongue,
which, according to the method suggested by Sir

Everard Home, I determined to remove by ligature. I drew the double ligature as tight as I could; and when I saw the patient half an hour afterwards, the piece of the tongue thus strangulated was quite livid, and apparently dead. I saw him again in three or four hours, and found him suffering a great deal of pain and inconvenience. It occurred to me that the piece of the tongue had been dead for some time, and that there could be no objection to my giving him relief by cutting off the ligature. With some little trouble I succeeded, but, to my great annoyance, the next day I found the whole piece, which had appeared to be dead, to be still living. The ligature, therefore, in surgical operations, must not only be very tightly drawn, but left on until it is separated by a natural process.

Mortification from Pressure.

Parts may be killed by a continued pressure. The mode of death here is nearly the same as when they are killed by ligature, the difference being simply this : the pressure is like a ligature applied to a broad surface, operating not merely on the principal vessels, but also on all the small vessels and capillaries. Mortification from pressure is chiefly observable when the pressure is made on parts which lie over a bone; where there is no cushion of flesh between the latter and the skin. If the pressure be very great, it may produce mortification immediately. I remember that when I was a student, a man came into the hospital with a fracture of the leg. The surgeon applied

splints, and drew a very tight bandage over
them round the foot. The next day the man
was in a great deal of pain and suffering. The
bandage was removed, but it had already occa-
sioned a broad slough of the skin over the instep.
I have, in other instances, seen sloughs produced
in the same manner, almost instantaneously, in
consequence of bandages being applied too tight.

But in the greater number of cases where
mortification is the result of pressure, it does not
occur immediately, but after the lapse of some
time ; and it is not a direct, but a secondary con-
sequence of the pressure. A man, for instance,
is bed-ridden ; he lies on a hard mattrass ; he
becomes emaciated ; the skin over the *os sacrum*
becomes tender to the touch ; it inflames, assuming
a dark red colour ; vesications form upon it ; the
inflammation goes on, and ends in mortification.
Pressure, then, may produce immediate mortifica-
tion in some instances, but in ordinary cases it
does so by causing inflammation first, which
inflammation, the pressure being continued, ends
in the same manner.

This kind of mortification from pressure takes
place under certain circumstances more readily
than under others. A patient is weakened by con-
tinued fever, and, from the state of debility in
which he then is, pressure on the skin over the
os sacrum, the great trochanter, or other projecting
parts of bone, will produce mortification, while it
would not produce it if he were in a state of
health. After injuries of the spinal chord mortifica-
tion from pressure is very readily induced. In

a case in which the spinal chord is injured in the middle of the back, you may find, almost before you suspect that there is any thing wrong, a great slough over the sacrum,—nay, the pressure of the mattrass on the ankles, will, in such cases, produce the same mischief. I have known mortification begin in the ankle within twenty-four hours after an injury of the spine; and a remarkable circumstance it seems to be, that injuries of the spinal chord should thus lessen the vital powers, so as to make the patient liable to mortification, when we consider how many circumstances there are that would lead us to doubt whether the nerves have any influence over the capillary circulation. The circulation, viewed by a microscope, in a frog's foot, goes on just the same whether the nerves are divided or not. In an experiment which I was making on poisons, I divided all the nerves in a dog's axilla; I then divided not only the skin which was attached to the anterior extremity, but also the muscles and cellular membrane, so that there was an absolute want of union between the extremity and the trunk, except by means of the axillary artery and vein, which I left untouched. The animal, at the expiration of twenty-four hours, was killed, but the limb maintained its vitality all the time. In spite, however, of this and of other circumstances which I might mention of the same kind, even a concussion of the spinal marrow will make the patient liable to mortification of the parts below.

Patients are more or less disposed to mortification from pressure, accordingly as they are more

or less emaciated.   A man with a cushion of fat
between the skin and the os sacrum, or the skin
and the great trochanter, is in less danger of such
mischief than another person.   The explanation
of this is sufficiently obvious.

When you suspect that pressure on any part is
so great as to be likely to occasion mortification,
you can do nothing but remove the pressure.
When a bandage is applied in a case of fracture,
you must remove it as soon as you suspect that
the swelling of the parts has increased the tension,
lest mortification should follow.   When a patient
has been so long confined to his bed, that you
expect mortification to take place, you should
bear in mind that it is more easy to prevent
it than to stop it when it has once begun.   How,
then, is this to be accomplished ?   If a patient
lies on his back, the skin sloughs over the os
sacrum ; if on one side, then it sloughs over
the great trochanter.   Endeavour, when he can
manage it, to make him vary his posture.   Let
him lie at one time on his back ; at another,
on his side ; nay, let him turn round, and lie
occasionally on his face.   If you have what they
call a prone couch, properly constructed for the
purpose, he may, in many instances, use it to
great advantage.   In one of the worst cases of this
kind, when mortification had begun, I used to turn
the patient on his face during many hours in the
day, and with perfect success.   But sometimes the
patient cannot be shifted.   There may be fracture
of the thigh, and he must lie always on his back ;
you must then endeavour to take off the pressure

by other means,—by an air cushion with a hole in
the centre, the tender part over the os sacrum
being in the hole of the cushion. But in all cases
where you use an expedient of this kind you
should first apply a piece of common soap plaster,
spread on calico, over the part, (or, what is still
better, the amadou spread with soap plaster, which
I have mentioned in a former lecture,) to support
it. If you merely place the hole of the cushion
under the os sacrum, the skin will bulge into the
hole, and the patient will be as badly off as if there
were no hole at all, or even worse. In cases where
you can have recourse to it, Dr. Arnott's hydro-
static bed is very useful in preventing these ill
consequences. When you lie on a mattrass, the
pressure is thrown on all the prominent parts of
the body, and there is very little elsewhere; but
in using the water-bed the water rises to fill up
the hollow places, and the pressure is not greater
on the sacrum than it is on other parts. Un-
doubtedly this bed is the best method which has
yet been contrived for the equal diffusion of pres-
sure; the only objection to it is, that it is not
applicable to all cases. In cases of compound
fracture of the thigh or leg, for example, it would
not give sufficient steadiness to the injured limb.

But another plan may be adopted to prevent
mortification from pressure; that is, to prevent
the inflammation which precedes it. The thicker
the cuticle the more it will protect the parts
beneath; you may, if you attend to it in time,
add to the thickness of the cuticle by stimulating
the surface of the skin. Nurses know this very

well, for when patients are bed-ridden they wash the parts subjected to pressure with brandy. What is still better is a lotion composed of two grains of the bichloride of mercury to an ounce of proof spirits. When you think that a patient is likely to be confined so long in bed that sloughs may be formed on the os sacrum, begin at an early period to wash the parts two or three times a day with this lotion. I have found it useful in other cases where a patient suffers from pressure. For example, in a case of hernia, which requires to be supported by a very powerful truss; the truss galls and frets the skin, and may at last cause inflammation and sloughing; but under the use of a stimulating lotion a thicker cuticle is generated, and such mischief is avoided.

The sores which remain after the separation of a slough produced by pressure are to be treated like common sores; this being kept in view, that fresh sloughs will form if the pressure be continued. You must, if possible, contrive to take the pressure off these sores; but, unfortunately, it is not always possible for you to do so, and in spite of all your care and trouble, it will sometimes happen that slough will form after slough, exposing the sacrum or trochanter, or other bony structures, whatever they may be.

Mortification from Contusions and Traumatic Gangrene.

I next draw your attention to cases of mortification from a blow or other mechanical injury. It may be said that pressure is mechanical injury, but

I now speak of a sudden injury operating for a short space of time, such as a contusion or a wound.

The effect of mechanical injury may be to produce mortification, which is confined to the parts actually injured. For instance, a man gets a kick on the shin, and the next day there is a slough of the skin where the injury was inflicted. The kick has squeezed the skin against the bone, ruptured the capillary vessels, and destroyed the organization in the part, so that the circulation could not go on. But here the mortification is confined to the part actually injured. A remarkable circumstance happens in some of these cases. The cellular membrane has not so much vitality as the skin ; and, therefore, perishes more easily. A blow will disorganize the cellular membrane which will not disorganize the skin. A man came into the hospital who had had a severe blow on the instep. There was a purple appearance, but no very extensive ecchymosis ; and I thought nothing of it. The next day I found the part inflamed ; the following day there was a good deal of swelling ; and on the third day the skin was beginning to slough. I divided the skin with a lancet, and found a large slough of the cellular membrane. The blow had pressed the skin and the cellular membrane against the bones of the instep, and had killed the cellular membrane, but not the skin. The slough of the cellular membrane would have been followed by an extensive sloughing of the skin, if, acting on the principle explained in my last lecture, I had not divided the latter freely. In cases in which you suspect that the

cellular membrane may be destroyed, while the
skin is not, you must watch the patient ; and if
there be swelling and inflammation you should
divide the skin, and save it from perishing as far
as you can, though you cannot save it entirely.

But in other cases the mortification is not con-
fined to the part actually injured, but may extend
to the greater part of the limb. These are the
cases to which the name of traumatic gangrene
more commonly is applied. A severe injury is
inflicted on the leg, and a large portion of it mor-
tifies. It would appear that the mode in which
traumatic gangrene is produced varies in different
cases. Mr. Guthrie, for example, describes a case
in which mortification of the leg took place as high
up as the knee, in consequence of a blow on the
back of the leg. The limb was amputated ; and
when he came to dissect the parts, it was found that
the blow had lacerated the lining membrane of the
popliteal artery, in consequence of which there had
been effusion of lymph into the cavity of that
vessel, stopping it up. That alone might not have
produced mortification, but the anterior and pos-
terior tibial arteries were torn through also ; and
the result of this double injury was, that the
limb, not getting a proper supply of blood, perished.
In this case the pressure of extravasated blood
might have contributed, in some degree, to pro-
duce the mortification. But local extravasation of
blood, if it exist to a very great extent, is, of itself,
sufficient to produce this effect. When I was house-
surgeon, a man was brought into this hospital,
with some kind of tumor above the groin, but no

pulsation was felt in it; and no one suspected that it was an aneurism. There was severe pain felt in the thigh, evidently arising from pressure on the anterior crural nerve, and the event proved that there was an aneurism, though it had not been indicated by the usual signs. It burst one day into the cellular membrane. The man screamed out as if he was being murdered, so horrible was the pain. The next day there was gangrene as high up as the groin, and death ensued in about a fortnight. On dissection, we discovered that an aneurism of the external iliac artery had burst under Poupart's ligament into the cellular membrane of the thigh. The extravasation of blood had prevented the circulation from being carried on in the limb; and, hence, it mortified. There was a patient in the hospital who had popliteal aneurism. I had fixed the day for tying the femoral artery; but, on the day previous to this, the aneurism burst into the calf of the leg, and the next day the limb was in a state of mortification; so that, instead of tying the artery, I had to amputate the leg. The vessels below were all quite pervious, and the circulation would have gone on very well, but for the pressure produced upon them by the immense extravasation of blood. No doubt, in many cases of traumatic gangrene, this is the principal cause of the mortification.

But traumatic gangrene takes place in another way; and, to illustrate what I mean, I will mention the circumstances of another case which occurred in this hospital some few years since. A poor boy was jumping over a ditch, and fell with consider-

able force upon his feet. There was a compound fracture of the leg above the ancle. The external wound was trifling, but it was evident that a great shock had been given to the foot and the leg. Four days afterwards, the limb was in a state of mortification as high as the knee, and the mortification seemed to be extending to the thigh. I amputated the thigh as high up as I could, near to the great trochanter. We dissected the limb very carefully afterwards. The large arteries, and also the large veins, were quite pervious. There was, in fact, no injury whatever to the arterial trunks, but the cellular membrane, the muscles, and, in short, all the structures, seemed to be more or less disorganised. There were spots of ecchymosis in the large nerves; the periosteum was universally detached from the fibula, and very nearly so from the tibia. The adhesion of the periosteum to the bone is by means of the small vessels. It is evident, then, that the shock of the accident must have occasioned a great injury to the small vessels connecting the periosteum to the tibia and fibula; and the probability is, that the same kind of injury inflicted on all the capillary vessels of the limb laid the foundation for the mortification. I do not see how the occurrence of mortification, in cases like this, can otherwise be explained.

It has been a sort of *dictum* of the schools of surgery that you should not amputate while mortification is going on; and, certainly, where there is mortification from ossified arteries (as I shall hereafter explain), or where there is mortification from inflammation, you ought to wait for the

mortification being stopped, and for the formation
of a distinct line of separation, before you proceed
to an operation. But it must have been palpable
to every body who took the pains to consider the
subject, that this rule would not apply to all cases
of mortification. For example, a man has a stran-
gulated hernia; when you open the sac you find
the omentum strangulated, a part of it dead, and
the mortification still extending. You would not
hesitate in a case like this to cut off the dead and
dying omentum. If piles were undergoing the
process of mortification from being strangulated
by the sphincter muscle, you would not hesitate
to cut them off. You may conceive many other
cases, in which the cause of mortification is local,
and to which the general rule which I have just
mentioned does not apply. Baron Larrey has the
credit of having pointed out more distinctly than
had been done before, that, where there is mortifi-
cation from local injury, you may venture to
amputate, though the mortification is still spread-
ing. But I apprehend that the operation must be
had recourse to at once, and that the case admits of
no delay. If, in consequence of mechanical injury
to a limb, mortification has begun, but has not yet
produced any severe shock on the system, there
you may amputate. But where the mortification
has been going on for some days, so that the sys-
tem has begun to be influenced by it, the pulse
getting weak, perhaps intermitting, and with great
prostration of strength; in such a case you must
not venture to amputate. Under such circum-
stances, it is probable that the system is not in a

state to bear the additional shock of the operation,
to say nothing of the loss of blood.   However, I
believe that cases enough may be adduced to
prove that Baron Larrey's rule, of not waiting to
amputate till the mortification has stopped, is
applicable in a great number of instances where
the disease arises from local injury.   It is good in
theory ; and there is now sufficient experience to
enable us to say that it is good in practice also.

LECTURE XVII.

ON MORTIFICATION—*continued.*

Destruction of Parts by Caustics.

PARTS may be destroyed by the application of various substances, which exercise a chemical action on the materials of which their organization is composed. We call these substances caustics, and sometimes escharotics. This is a subject of especial interest in practical surgery; and in considering it I shall not confine myself to the *modus operandi* of caustics, but I shall extend my observations to the modes of using them, and explain some of the principal occasions on which you may, in the treatment of diseases, have recourse to them with advantage. I have no scruple in doing this, as I am not restricted by the rules of a systematic course of lectures, and need have no object in view, except that of making these discourses as useful to you as possible.

I have said that caustics act chemically, destroying in this manner the organization of the parts to which they are applied. If there be any exception to this general rule it is in the case of arsenic, in the operation of which there seems to be something peculiar. I make this observation, because it has appeared to me, that, while other

caustics have a manifest action on the dead body, it is not so with arsenic. I very much suspect that arsenic acts merely on the fluids, while ordinary caustics act on the fluids and solids also. However, I offer this to you as a conjecture, and as a matter deserving of further inquiry, and not as a well established fact. All other caustics which I have made the subject of experiment produce a distinct alteration in the condition of the dead body, though different in appearance from what they produce on the living, in which they operate on the fluids as well as on the solids, and in which the blood moving in the small vessels conveys their influence beyond the surface to which they are actually applied.

A great variety of chemical agents may be employed as caustics. It would be an endless task for me to describe all of those with which I am myself acquainted, and even if I were to do so, a multitude of others would be left unnoticed, of which I have no experience. I shall only speak of those which we are in the common habit of employing, and the right use of which will, if I am not mistaken, enable you to accomplish all that can be accomplished in this way.

There is some difference in the action of different caustics. Some act slowly, others rapidly; some produce much pain, others comparatively little pain. The pain caused by some is very severe for a short time; that caused by others is less severe, but of longer duration. Some destroy a part to a much greater extent than others. The slough made by one kind of caustic will separate much

sooner than that made by another. The period occupied by the separation of the slough seems to depend on the quantity of surrounding inflammation. If the inflammation at the margin be considerable, the slough is soon thrown off, whereas, if it be trifling, it may remain attached for a long period. If the caustic be applied merely to granulations, the slough separates much sooner than if it be applied to the skin, or to other parts of original structure.

There is no class of cases in which you will have such frequent occasion to apply caustic as those of exuberant granulations, such as are commonly called proud flesh. In some cases in which there is little disposition to form new skin, while the granulations rise above the level of the skin in the neighbourhood, it is important that the granulations should be reduced in size. On these occasions we commonly use the nitrate of silver, and it is for the most part sufficient for the purpose. You rub the part with it pretty freely, and the next day the exuberant granulations have disappeared, partly by sloughing and partly by absorption. There are, however, occasions on which you will find a large irregular mass of unhealthy granulations beyond what the nitrate of silver will easily destroy. Such granulations as those to which I now allude are frequently generated over a carious surface of bone, and you will then find the ointment which I am about to mention to be an excellent caustic application. It is a very old prescription, but not the worse on that account. The ointment consists of verdigris, sulphate of copper, and the

red oxide of mercury, of each two drachms, the bichloride of mercury one drachm, with as much hog's lard as is necessary to blend them together. This may be spread on lint, and one or two applications will be sufficient to destroy a very large mass of fungous granulations.

One mode of making an issue is by means of caustic; and for this purpose we generally employ the caustic potash (*potassa fusa*), or strong nitric acid. The former may be rubbed on the part until it has penetrated through the skin, and that is enough. If you continue rubbing it afterwards it penetrates deeper than is necessary, and probably gives rise to considerable bleeding. This caustic continues to spread after you have ceased to apply it; and you must make an allowance for this when you use it, otherwise you will make too large a slough. The caustic potash may be used in other ways; it may be made into a paste with an equal quantity of soap, spread on some linen rag, laid on the part and allowed to remain there for an hour, or longer; or a paste may be composed of two parts of the caustic potash and one part of lime, rubbed down with some alcohol, and applied in the same manner. This last has obtained some celebrity under the name of the " Caustic of Vienna." The effects of the nitric acid extend a little after it has been applied, but not so much as those of the caustic potash. It may be applied by means of lint on the end of a probe dipped in the acid, and rubbed for several minutes on the surface. I have seen issues made by the nitrate of silver made into an ointment and laid

upon the part. It makes a slough of the skin, and, as far as the mere issue is concerned, will do very well; but it is very slow in its action, and causes ten times the pain produced by the other caustics.

When an issue is open you want to keep it open, while perhaps it has a tendency to heal. Then there are occasions on which something is required to prevent sores, or the orifice of a sinus, from healing. A man may have a small sinus by the side of the anus. If the orifice heal the matter collects within, and the result is the formation of a fresh abscess. In either of these cases, the best thing that can be done is to touch the margin of the issue, or the surface of the sore, or the orifice of the sinus, now and then with the caustic potash. It makes a slough which takes some time to separate, and the application of it once in ten days or a fortnight will answer the intended purpose. I have often known the nitrate of silver to be used with the same intention, but in fact it promotes cicatrization, and heals the sore or the sinus, instead of keeping it open.

There is an occasion on which you will not unfrequently have occasion to apply caustic, and where it is very material indeed that it should be done in a careful and scientific manner. I refer to cases in which a person has been bitten by a rabid dog, or a dog supposed to be rabid. On these occasions it is generally better to excise the part thoroughly, and to take out a good deal of the surrounding parts. But it sometimes happens that this cannot be very easily accomplished. A person, for instance, is bitten in the

palm of the hand; the dog's tooth penetrates into
it, and it would be a very serious thing to cut out
tendons, nerves, and every thing else down to the
metacarpal bones; or it may be that after the
excision you find on examination that the tooth
has penetrated further than you had supposed, and
where you cannot very easily follow it with the
knife. On these and similar occasions, you can
do nothing better than trust to the application of
caustics.   Mr. Youatt, the veterinary surgeon,
who has had great dealings with rabid dogs, tells
me that when he has been bitten he has always
applied the nitrate of silver, and he is alive and
well now; so that in his case, this kind of caustic
has done all that has been required. But then
he applies it at the very instant when he is bitten;
whereas very few of your patients have the nitrate
of silver in their pocket, or could apply it if they
had. The best caustic, I apprehend, for you to
use on these occasions is the caustic potash; and
for this reason : that it dissolves the parts with
which it comes in contact, and that afterwards
the dissolved caustic penetrates still further beyond
the part to which it has been actually applied.
If the tooth penetrate to the cellular membrane,
by the time that you are consulted some of the
saliva may have reached the cells beyond, and if
you apply the nitrate of silver, or the nitric acid,
these will coagulate the fluids and harden the
solids, while the caustic potash becoming diffused
will follow the course of the saliva. A convenient
way of applying the caustic on these and on some
other occasions is this : melt it in a silver or

platina spoon, and, when melted, dip into it the blunt end of a probe. It will come out with a varnish of the caustic upon it; dip it in again until the button of caustic has attained a sufficient size. By means of a probe thus armed you may carry the caustic even into a very narrow wound, so that you are sure it will penetrate wherever the dog's tooth has penetrated; after which, from the particular nature of the caustic (as I have just explained) you may be certain that it will penetrate still further, and as far as the poison can have reached.

Caustics may often be used very advantageously for the purpose of destroying diseased lymphatic glands. A man has chronic inflammation and enlargement of the glands in the groin, forming a considerable tumor. The skin over them ulcerates, forming, at last, a large ill-conditioned ulcer, which will not heal. The reason of this is plain enough. No ulcer will heal unless it has a healthy basis, and here the basis is a mass of diseased glands. These diseased glands may take a long time to recover themselves; some months, or even a year; and, as there are plenty of glands to spare, there is no harm in destroying those which are diseased. You may effect this by the caustic potash, but not very well. You want some kind of caustic which will lie in the substance of the diseased glands, and destroy their internal structure, as well as their outer surface. The form of caustic I am going to mention was used by the late Mr. Pearson, from whom I had the prescription. It consists of one ounce of crumb of bread, two drachms of the

bichloride of mercury, and one drachm of red oxide of lead. These are to be mixed together, kneaded with the fingers, and formed into a sort of paste. The paste should be rolled into little conical troches, and these, if left to dry, become hard, like what are called bread seals. These troches may be stuck into the enlarged gland like pins into a pincushion. In the course of a little time they begin to act, as the patient knows from the pain produced. The pain lasts for some hours, and if a sufficient number of the troches be employed, the whole of the gland is at once destroyed. If any portion remains, it is easy to destroy it by repeating the process. I do not know whether the red-lead answers any useful purpose; I suppose not; but I found it in the original prescription; and on all occasions where I find a particular prescription to do just what is wanted I am a little unwilling to alter it.

Caustic may be applied to various morbid growths; and I am inclined, on the whole, when these can be easily destroyed by caustics, to use them in preference to the knife; and for these reasons : *first*, the former are, on the whole, much less formidable to the patient; *secondly*, if I am not very much mistaken, there is less chance of any ill consequences from the application of caustic, than from even a small operation with a knife. For example, you very seldom find an attack of erysipelas follow the use of caustic; certainly much less frequently than after the use of the knife. Again, the slightest wound in certain constitutions will be followed by that diffuse inflammation of the

cellular membrane, terminating in gangrene, which I noticed in a former lecture. But I do not recollect that I ever saw the same thing to happen after the use of caustic. The cases, however, to which caustics are applicable, are only those in which the morbid growth is of small size, and placed quite superficially. Undoubtedly, it would cause too much suffering to the patient, and, in consequence, too great a shock to the constitution, if a morbid growth of very large size were to be destroyed in this manner.

There is a very common kind of morbid growth in the form of warts and condylomata, which occur in women about the pudenda, and in men on the glans penis and about the anus. These are very easily destroyed by caustic. The nitrate of silver will destroy warts on the glans penis very well, if they are of limited extent, but not when they are collected in large masses. In such cases as these strong nitric acid may be employed. Rub the warts with it, and repeat the application, from time to time, till the whole are destroyed. The following application will answer the purpose in cases where the warts are not very extensive: a drachm of hydro-chloric acid, added to three drachms of sesqui-chloride tincture of iron. This destroys the warts, but not very rapidly. The application must be repeated every day for some time, until they shrivel, decay, and drop off; and the patient may do this for himself. There is a very common escharotic, and a very useful one, for warts on the glans penis or pudenda, where they do not exist to a great extent, namely, equal parts of powdered

savine and verdigris. This, being sprinkled on the
warts, destroys them, partly by making them
slough, and partly by promoting their absorption.
Another excellent caustic, on this and some other
occasions, is this : take half an ounce of strong
nitric acid ; add to it a scruple or more of the
white oxide of arsenic. It makes a beautiful blue
solution, consisting of the nitrate of arsenic, dis-
solved in nitric acid. This may be applied to the
warts by means of a probe armed with lint ; and it
has a double operation. The nitric acid acts imme-
diately ; and when it has ceased acting, the slough
contains a certain quantity of arsenic, which con-
tinues to operate afterwards.

On this occasion, as on many others on which
you use nitric acid, without care, you will be in
danger of burning the neighbouring textures. A
woman who has warts on the pudenda wishes to
have them destroyed, but she has no desire that
the skin in the neighbourhood should be burned.
This, however, will happen, unless you use means
to prevent it. If you use nitric acid you should
have at hand a solution of the bicarbonate of
potash, by applying which you may neutralize the
acid as it flows beyond the surface on which it is
intended to act, and stop its operation. I may
observe, here, once for all, that there are many
occasions when it is necessary to use similar pre-
cautions. Indeed, almost always, when you use a
caustic, it is prudent to have some counter-agent
at hand to stop its action if it reaches a sound
part. Acids may be neutralized by alkalies ; caustic
potash may be neutralized by vinegar, or by a

solution of the diacetate of lead. If you are afraid
of nitrate of silver burning the neighbouring parts,
its action may be neutralized by common olive oil.
A solution of the bicarbonate of potash will decom-
pose chloride of zinc ; and so with other caustics.

Caustics may be used, with great advantage, in
many cases for destroying the congenital vascular
tumors which we see so frequently in children ;
nœvi, as they are sometimes termed.

There are small vascular spots, not exactly con-
genital, though they occur in early life, which
present themselves on the face of children, and
which, not unfrequently, are objects of some
anxiety, especially in the higher classes of society,
as they form rather ugly red specks on the face.
On examining one of them with a lens, you see
one large vessel in the centre, and small branches
radiating from it. These spots, in most instances,
if let alone, will, in the course of time, disappear
spontaneously. If, however, it be thought desirable
not to wait for the natural cure, you may destroy
them in the following manner. If the principal
vessel be near the surface, touch it, through the
cuticle, for an instant, with strong nitric acid, and
it will contract, and become obliterated. This is
best done by means of a pointed piece of glass,
which they sell as a sort of toy, under the name of
a glass pen. It is, in truth, as bad a pen as possible,
but it answers this purpose, and some other pur-
poses in surgery, extremely well. If the acid flow
over the cheek, you may neutralize it by applying
a solution of the bicarbonate of potash. But
this method is not sufficient for the destruction of

these vascular spots in every instance; and there is another, and a still more certain, method of proceeding. Puncture the principal vessel from which the others radiate with a lancet, and then introduce into the puncture, merely for a single instant, a piece of caustic potash, scraped into the form of a pencil, with a very fine point. Touch it, I say, for a moment only; this will be quite sufficient. But even after so slight an application, you will find that the caustic has also burned the margin of the skin, and, unless you adopt other measures, a trifling mark will be left. All that is required is the application of a very little vinegar, by means of a camel's hair brush.

There are some congenital nœvi which are altogether cutaneous. There is a very intricate plexus of little vessels in the skin, filled with scarlet blood, which, being elevated above the surface of the surrounding skin, assumes an appearance which may be compared to that of a raspberry. If a nœvus·of this kind be of large size it must be removed by the knife or by a ligature, but if it be small you may destroy it very well with caustic. You should not employ the caustic potash, which would produce bleeding, but rather have recourse to nitric acid, which destroys the nœvus sufficiently, while at the same time it coagulates the blood in the small vessels, rendering the nœvus more solid than it was before. With a piece of stick or a probe armed with lint, and dipped in the acid, paint the surface of the nœvus, taking care that you include the whole, without burning the neighbouring parts. This makes a

slough of the surface of the nœvus, and at the same time causes the blood to coagulate in the small vessels below, and thus renders them impervious. But, let me repeat that this method is applicable only where the nœvi are of small size.

There are subcutaneous nœvi formed by vascular tumors in the texture under the skin, and not in the skin itself. These put on a different appearance from the cutaneous nœvi before mentioned. The blood here is seen, not of a scarlet, but of a purple colour, because the skin lies over it. These may be destroyed by caustic when they are of small size ; and even when they are of large size, if it be a great object to avoid the scar which must exist after the removal of them by the knife or by ligature. These vascular nœvi have sometimes been cured by vaccination. Half a dozen punctures have been made with a lancet armed with vaccine lymph. The pustules being crowded together in the nœvus, a good deal of inflammation has ensued, with some degree of sloughing, and between the two the nœvus has been cured. But you cannot depend on this method ; at least so I am informed by those who have practised it, for I have not tried it much myself; but you may, acting on the same principle, very easily cure such a nœvus by caustic. For this purpose I have a very narrow knife, perhaps about the eighth of an inch in width ; I introduce it into the middle of the nœvus, and move it in different directions, so as to cut to pieces, as it were, its vascular structure. I then have a probe armed by dipping the blunt

end of it into nitrate of silver melted in a platina or silver spoon. The probe thus armed is to be introduced into the puncture made by the narrow lancet, and moved about, so that wherever the lancet has divided the blood-vessels the caustic may penetrate also. It causes inflammation and sloughing, at the same time obliterating the vessels beyond the margin of the slough. When the slough is separated there is a slight discharge of pus for a few days, and if the tumor be of small size you will find that it is cured; but if it be large the application must be repeated. I have used this on several occasions with great advantage, especially when the tumor has been on the face, where it was a great object not to destroy the skin. If you remove one of these tumors either by the knife or by ligature, you must in either case leave a large cicatrix. But by applying the caustic in the way which I have mentioned you save the skin. I was requested to see a little child that had one of these subcutaneous nœvi at the tip of the nose, giving it a very ugly appearance. By far the greater part of the alæ of the nose was involved in the tumor, and to have cut it out would have disfigured the child for life. I treated it according to the method which I have just explained. Several operations were required, but they succeeded perfectly; the child is quite cured of the nœvus, and I will not say that you see no mark at the end of the nose, but there is so little, that unless your attention were called to it, you would not know that any thing had happened. I have destroyed an extensive subcutaneous nœvus,

occupying a very large portion of the face, in the same manner, there being very little or no scar afterwards.

There is another class of cases which may be very conveniently treated with caustic, and in general much better than with the knife—I mean those tumors which I have been in the habit of calling *half-malignant*, and which occur on the face chiefly of elderly people. A man has a soft tubercle upon the face, covered by a smooth skin. He may call it a wart, but it is quite a different thing. On cutting into it you find it consists of a brown solid substance, not very highly organized. A tumor of this kind may remain on the face unaltered for years, and then, when the patient gets old, it may begin to ulcerate. The ulcer spreads, slowly but constantly, and if it be left alone it may destroy the whole of the cheek, the bones of the face, and ultimately the patient's life ; but it may take some years to run this course. So far these tumors in the face, and these ulcers, are to be considered as malignant. Nevertheless they are not like fungus hæmatodes or cancer ; and for this reason, that the disease is entirely local. It does not affect the lymphatic glands, nor do similar tumors appear in other parts of the body. I have generally been in the habit of destroying these tumors with caustic, and when they are of small size I prefer it to the knife, for the reasons I have formerly mentioned. If a patient applies to you with one of these tumors as large as a pea or a horse-bean, not ulcerated, but beginning to increase in size, you

may proceed in the following manner : first, make
a crucial incision through the substance of the
tumor with a lancet; then, as soon as the
hæmorrhage has ceased, apply the caustic potash
in the incision. You may destroy the tumor if
you please by letting the caustic act on the skin
without using a lancet, but its destruction is much
more easily accomplished in the manner which I
have suggested. One application is generally
sufficient; the slough comes away, and the sore
heals. Perhaps it will be asked, Is there not this
objection to the use of caustic : namely, that some
time is necessary for the slough to come away ;
then a further time for the healing of the wound?
and does not all this make the process of cure
more tedious than it would be if the knife were
used instead ? The fact is, that a wound always
heals much more readily after the application of
caustic, than after the use of the knife. Take
two cases : if you destroy one tumor of a given
size by the knife, and the other, supposed to be
of the same size, by caustic, in spite of the time
occupied by the separation of the slough, the
sore in the latter case will be healed sooner than
that in the former.

If the tumor be ulcerated, this is favourable
rather than otherwise to the use of the caustic,
because it saves the trouble of dividing the part
with a lancet ; when, however, the tumor has been
of long standing, and has produced an extensive
ulceration, the caustic potash will not well answer
the purpose. There will be so much bleeding from
the large surface that the caustic will expend its

action on the blood, and will produce but little effect on the disease. You may then destroy the tumor with nitric acid; but the best applications, according to my experience, are the chloride of zinc or arsenic. There is, however, one very serious objection to arsenical caustics applied to a large surface; namely, that the arsenic is sometimes absorbed, producing severe constitutional symptoms. There was in former times a Miss Plunkett, a quack, who pretended to cure cancer, and it was known afterwards that her secret consisted in the application of arsenical caustics. An old medical practitioner, whom I knew in the early part of my professional life, informed me that it had fallen to his lot to see many of Miss Plunkett's patients, and that after the application of her caustics many of them died, from what seemed to be inflammation of the bowels. It is indeed notorious that the topical application of arsenic to a great extent is very likely to produce the same poisonous effects as arise from an absorption of it from the alimentary canal. The chloride of zinc acts merely locally; nothing deleterious is absorbed into the constitution, and its use is not attended with any constitutional disturbance, nor productive of the smallest danger. I generally use the chloride of zinc by mixing it with an equal quantity of flour. It deliquesces from the moisture of the atmosphere, or you may add a little water to make it into a paste, which is to be spread on lint. If you want a deep slough, spread the paste thick; if a superficial one, spread it as thin as you please. The depth of the slough depends on the thickness

of the paste, and the thicker it is the longer the action of it continues. The application of the chloride gives the patient a good deal of pain, which you must make him endure as well as you can, by the administration of opium. Some patients suffer much more than others; some will not require any opium at all, others will require it in large doses. When the action of the caustic has ceased there is of course an end to the pain, and the slough comes away in a few days. If the ulcerated surface be of large size, and the disease of much depth, a second application may be required. When the disease is situated over a bone, I generally like to procure a thin exfoliation of the latter, and the caustic accomplishes this very well, acting on the bone, but not to any great depth. The exfoliation takes place in a few weeks; and when the thin layer of dead bone has come away, healthy granulations are seen beneath. Sometimes, after having destroyed a great part of an ulcerated tumor with chloride of zinc, a small portion of it may be left here and there, to which you may apply the caustic potash or solution of arsenic in nitric acid. This solution of arsenic, or any other preparation of arsenic, may be applied to a small surface very safely. Observe, that what I object to is merely its application to a very large surface. I am told that the nitrate of zinc may be used as a caustic also, but I have no actual experience of it.

Ulcerated tumors, similar to those which occur on the face, are sometimes met with on the scalp; and these, too, may be destroyed with caustic.

You must, however, apply it in these cases with
great caution; and for this reason: if you destroy at
once a large portion of the pericranium, it is not
improbable that a separation of the dura mater from
the inside of the bone will be the consequence.   A
case of this kind, which I saw long ago, made a
strong impression on my mind. A surgeon applied
the caustic potash to the scalp, with a view to
make an issue in a man's head, who was labouring
under a head-ache, and nothing else.   When the
slough had separated a piece of the occiput was
exposed, as large as half-a-crown, or larger.   The
patient was soon seized with a set of strange symp-
toms, and died.   It was found that the dura mater
had become detached from the inside of the bone,
just opposite the part where the pericranium had
been destroyed on the outside; and it was clear
that the sloughing of the dura mater was the cause
of the man's death.   I mention this case to show
that you must be cautious in the use of caustic
when you apply it to the scalp; but you may
apply it there, nevertheless, if you proceed in
a prudent manner.   I had lately a very successful
case of one of these half-malignant tumors of the
scalp, which was much ulcerated, and had been
going on for some years.   I applied caustic to the
different parts in succession, not making a fresh
application until the slough made by the former
one had come away. By proceeding in this manner
the bone was not killed, except a very thin layer
on the surface, and the patient was cured.

You may, with proper precaution, apply caustics
to parts situated internally, even to the inside of

the mouth, and to the inside of the female urethra.
In that disease which we call epulis, a red tumor,
that looks like the gum, and which becomes con-
nected with it (though I believe that it really has
its origin in one of the alveoli), you may use
them with great advantage. It is in vain to
destroy the outer part of such a tumor, that is,
the part connected with the gum, unless you
also destroy the inner part, where it originates in
the alveolar process, also; and, from the surgeon
not being aware of this circumstance, I have, in
several instances, known repeated operations with
the knife, as well as the application of the hot iron
and caustics, fail. The caustic which I find in
general to be most convenient in these particular
cases is the *potassa fusa*. You must fix it at a
right angle to the end of a pair of dressing forceps,
and secure it well by tying thread round it. The
caustic should be scraped small enough to enter
the alveolus, the tooth having been previously
extracted. Having thus destroyed the disease
where it originated, you may afterwards apply the
caustic to the other portion which is connected with
the gum. But you will say, that it will burn the
tongue or the cheek; and so it will, if you are not
careful. You must let your assistant hold open
the cheek; and while you apply the caustic, he
must have at hand a brush, dipped in diluted
vinegar, which he is to apply wherever the caustic
spreads further than you intend it. I do not re-
commend this kind of treatment in the case of
a large epulis, in which it will probably be neces-
sary to take out a portion of the jaw; but it is

perfectly applicable to many cases in the early
stage of the disease. With a somewhat similar
precaution, you may apply caustic to destroy the
vascular excrescence, which is met with not un-
frequently in the female urethra ; a disease first
described by Sir Charles Clarke, and of which you
will find some account, also, in my lectures on
diseases of the urinary organs. For these cases
you should be provided with a silver tube or
shield, closed at one end, and open on one side.
Introduce this into the urethra, so that the vascular
fungus may project into the open side of the tube,
and there apply the caustic. Here also you
must trust to your assistant dabbing the neigh-
bouring parts with some liquid which will act as
an antidote to the caustic ; a solution of bicar-
bonate of potash, if you use the nitric acid, or
vinegar, if you use the caustic potash. In general,
in these cases, it is better, before you use the
caustic, to remove as much of the excrescence as
you can with a pair of scissors.

I have spoken of the application of caustics in
some cases of what I have called half-malignant
disease ; but, occasionally, they may be employed
in cases of true malignant disease, such as scir-
rhus and fungus hæmatodes. If one of these
tumors be of large size, it is better to use the
knife ; in fact, you cannot remove it otherwise.
It is in the case of smaller tumors that you may
use caustic with advantage. I will give you
an example. A lady consulted me concerning a
scirrhous tumor of the breast. The tumor was
very small, but there was a scirrhous gland in the

axilla; and where there is one scirrhous gland, you may be nearly certain that there are several others, though you cannot perceive them through the skin. I did not, therefore, recommend an operation. She came to London a year afterwards; the tumor having ulcerated, and there being severe, and, indeed, almost intolerable, pain. I applied to the ulcerated surface of the tumor a paste of flour with the chloride of zinc. The tumor was apparently destroyed, and the sore cicatrized. She continued well for a considerable time. Another tumor then showed itself, in the neighbourhood of the cicatrix, which was also attended with excessive pain, and that was destroyed in the same manner; as was a third tumor, that appeared afterwards. By this treatment her life was prolonged a full year and a half; and, during this time, she was in a state, not of misery, but of comparative comfort; being, generally, free from suffering. She died, at last, of an effusion of fluid into the pleura.

A lady, whom I attended last winter, had a fungous growth over the head of the tibia. It had all the appearance of malignant disease, was of considerable size, and was partly ulcerated. There had been a tumor there before, and her country surgeon had removed it; but the disease had returned. I removed it a second time, with the knife; and, as far as I could see, the operation included, not only the diseased structure, but the parts beyond, to a considerable extent. The wound appeared healthy, and went on healing favourably. Just, however, as it was healed, and when the

patient had fixed the day for leaving my care, there appeared, on the margin of the cicatrix, where there had been nothing before, a tubercle, which seemed to be precisely similar to what the other tumor had been in its origin. I destroyed this tubercle with caustic, and the sore, thus made, healed. A second and a third appeared, which were, also, destroyed in the same manner. No others have since shown themselves ; and I cannot but entertain some hopes that the disease is really eradicated.*

I must not recommend you to use the chloride of zinc, without giving you this caution respecting it : never apply it, except where there is an ulcerated surface. If you apply it to the skin, you must first put on a blister, to remove the cutis, as, otherwise, it will scarcely act at all. But, even when the cuticle has been removed, it will not act for the first twenty-four hours ; and it will then begin to produce intolerable pain, which will continue for four or five days. When the tumor is covered with skin, you must use the caustic potash or nitric acid first ; and when the superficial slough has come away, if the further use of caustic is indicated, the chloride of zinc may be had recourse to.

* Some years have now elapsed, and there has been no recurrence of the disease.

LECTURE XVIII.

I THINK it worth while to point out another case, in addition to those alluded to in the last lecture, in which the destruction of parts by caustic may be resorted to with great advantage. I refer to phagedenic and sloughing sores, whether they be those that occur upon the organs of generation in persons who have been exposed to syphilitic infection, or whether they be those that appear on other parts of the body, and to which the term " hospital gangrene " is usually applied. The destruction of the parts by a powerful escharotic frequently seems to destroy the poison on which the phagedena and sloughing depends. The best caustic for this purpose is the concentrated nitric acid, applied so as to make a slough of the diseased surface, and extending to the parts just beyond it. The destruction of them to a greater depth than this is unnecessary. This method of treatment was recommended some years ago by Mr. Welbank, who wrote a very interesting paper on the subject.

I have taken this opportunity of speaking of some of the principal cases in surgery to which the destruction of parts by caustic is applicable. But you will find a great number of others

in practice in which you may employ it with advantage. I need not, however, occupy your time further with this part of our enquiries. The observations which I have already offered will be easily applied to other cases; and will, I trust, be found sufficient to initiate you in this department of surgery.

Destruction of Parts by Heat.—The Actual Cautery.

The organization of the living body may be destroyed by the application of intense heat. A moderate degree of heat does not at once destroy vitality; it produces a peculiar kind of inflammation, with vesication of the skin; but a great degree of heat destroys at once the vitality of the part to which it is applied. Of course the action of heat is altogether chemical. No part will live if its organization be destroyed; and heat destroys the organization. There is one thing worthy of notice respecting the slough made by a hot iron; it is separated sooner than the slough made by caustic; that is, the two sloughs being of the same extent, that which is made by a hot iron is separated at an earlier period than that made by caustic. The reason of this is sufficiently evident. If you look at the injured part there is a much greater degree of inflammation round the slough made by the former, than there is round that made by the latter.

The destruction of a part by the application of heat to a small extent is attended with no constitutional disturbance; but if it be to a great

extent, the constitution is affected in proportion
to the quantity of parts destroyed. This, how-
ever, is remarkable : that where, on the surface of
the body, there is an absolute destruction of the
skin by intense heat, the constitution often
suffers, in the first instance, much less than if a
slighter degree of heat had been applied to the
same extent of surface. You will have frequent
opportunities of verifying this observation, if you
watch the comparative effects of burns and scalds
in the cases admitted into the hospital. I have
been surprised sometimes to find, where a great
deal of skin has been completely destroyed, how
little the constitution has resented the injury imme-
diately after it had been inflicted. But it resents it
enough afterwards ; and when the period arrives at
which the slough should be thrown off, then the
general system suffers. I remember a lady who had
both her arms burned, so that nearly the whole skin
of each upper extremity was completely dead ; yet
her constitution, in the first instance, seemed
almost unconscious of the shock ; as soon, how-
ever, as the line of separation at the margin of
the dead skin had begun to show itself, a change
took place, and she died in a day or two.

The actual cautery may be used for surgical
purposes on the same principle as caustics ; and
there is one occasion on which the former will
certainly do what the latter will not effectually
accomplish ; I allude to hæmorrhage. In some
cases of hæmorrhage from a great number of
small vessels, or from large vessels, which cannot
be secured on account of their being deeply

seated, the actual cautery is very serviceable. Except under these circumstances, I have not much had recourse to it. It does nothing which caustics would not do as well or better, and it is much more alarming and frightful, both to the patient and to by-standers. It was the habit of surgeons here, fifty or sixty years ago, to use the actual cautery to a great extent; and it appears to be one of the many proofs of the advancement of English surgery that we have got rid of what Sir Astley Cooper used to call " a rude piece of " farriery."

Mortification from Animal Poisons.

I mentioned in a former lecture that I had seen a man who died of extensive sloughing of the cellular membrane, after the sting of a bee. I stated that I attributed this chiefly to his being of a bad constitution, though perhaps something might be attributed to the influence of the animal poison. My reason for making the latter observation was this : that there are certain other animal poisons which have the effect of producing mortification, especially of the cellular membrane. There is a work of the Abbe Fontana in which he describes a great number of experiments on the smaller animals, made with the poison of the viper, and the principal local effect that he observed was gangrene of the bitten limb. When I was first assistant-surgeon, a man was brought into this hospital under the following circumstances. A rattlesnake was exhibited in Piccadilly, and this poor fellow went to see it. He was a car-

penter, and having dropped his rule into the
rattlesnake's cage, he introduced his hand to take
it out, and the snake bit him. He was immediately
brought to the hospital in a state approaching to
that of syncope, with violent pain extending up
the arm. The next day the whole arm was
swollen, and the skin looked purple ; there were
vesications upon it, as if sloughing were going on
in the subcutaneous cellular membrane. The
man lingered here for nearly three weeks, and
then died. At the time of his death there was
extensive mortification, not only of the skin of the
fore-arm, but also of the whole of the cellular
membrane, from the bitten finger up to the
shoulder. From the appearance in the beginning
there could be no doubt that the sloughing pro-
cess of the cellular membrane had begun imme-
diately after the injury was received. The skin
itself seemed to have mortified only because it lay
over the dead cellular membrane, and, what is
curious, the muscles underneath were not at all
affected. The poison seems to act (as far as its
local operation is concerned) especially on the cel-
lular membrane. This was proved not only by
this particular tissue sloughing so extensively, but
also by this circumstance, that, within an hour
after the bite, extravasations of blood (ecchy-
moses) might be traced in the cellular membrane as
high as the shoulder, and from thence downwards,
on the side of the chest, as low as the false ribs,
presenting altogether a very singular appearance.
The poison, indeed, seemed to operate on the
cellular membrane neither in the direction of the

nerves, nor in that of the absorbents, nor in that
of the blood-vessels. In fact it is difficult to
explain the local effects produced by this virulent
poison from the anatomical structure of the parts,
or on any known physiological principles. I am in
possession of the notes of an experiment made by
the late Mr. Ewbank (who died several years ago,
having been for some time my colleague in this
hospital,) with this same rattlesnake. A rabbit
bitten in the shoulder became affected by the
poison in a few minutes, and died at the end of
three quarters of an hour. Even in this short
space of time the cellular membrane, to a great
extent, was in a state of slough, although the skin
and the muscles were not affected. There are
several other animal poisons that operate in the
same manner.

I have only one practical observation to make,
in these cases, namely, that you may prevent the
extension of the mischief produced by the animal
poison, by the application of a ligature round the
limb, above the bitten part. It seems to stop the
influence of the poison upon the cellular mem-
brane, and, at the same time, to prevent it from
entering into the circulation, and affecting the
general system ; and we must bear in mind, that,
in these cases, besides its local operation, the
poison has a powerful influence on the consti-
tution. The constitutional symptoms, however,
are not to our present purpose, and, therefore, I
shall not describe them.

Mortification from Exposure to Cold.

As parts may be killed by excessive heat, so they may be killed by excessive cold. You might suppose that cold would produce the death of a part, in the following manner: that it would freeze it; and that the fluids, being frozen, and, to a certain extent, expanded in the act of freezing, the organization of the capillary vessels would be destroyed, and death of the part ensue; in the same manner as in plants and trees, which are killed by a severe frost. Two or three years ago, when there was some very mild weather, like that of spring, about Christmas, in many places the sap began to circulate in the evergreen trees. But this premature spring was followed by some days of most intense cold. The sap was suddenly frozen in the alburnum; and, as it froze, it expanded, and burst the vessels, and killed the trees, by destroying their organization. I said that you might suppose, at first, that death from cold is produced in a similar way in the animal body. I cannot say that such never is the case, but I do not find that that is the way in which it usually happens. When a part is frost-bitten, it is not, in general, killed at once; but, after being exposed to a warmer temperature, it inflames, and the inflammation immediately terminates in gangrene. I imagine that the influence of cold upon the animal body is scarcely ever so instantaneous as at once to freeze the fluid in the vessels; there is almost always time for them to contract and become emptied of their blood before the parts

are frozen. You may see this in your own fingers;
when they have been exposed, on a cold day, they
become quite shrunk and pale, as if there were no
blood in them, and may remain in this state for
a very long time. If, in a case of frost-bite, you
go to the fire, to warm the affected part, there is
a sudden reaction; inflammation is set up, and
mortification follows. In this country we have
very little experience of these cases. Every now
and then, indeed, a patient is brought into the
hospital, who has lost a part of his foot, perhaps
two or three toes, in this manner, but not until
some time after the mischief was done; and we,
therefore, do not see the process by which the
death of the part has been produced. There are,
however, abundant accounts of death from frost-
bite, furnished by persons who have been in cli-
mates colder than ours. I may refer, especially, to
a work by M. Beaupré, a French surgeon, who
followed the Emperor Napoleon in the Russian
campaign. By his account, it would appear, that
parts may be under the influence of cold for a
great length of time, so as to be completely
deprived of sensibility, and yet, with prudent
management, may recover perfectly. He states,
that he has frequently had his feet benumbed, while
riding on horseback, so that, for a long time, they
had been devoid of sensation, and that he has got
off his horse, without knowing whether they
touched the ground, or not; but, that by rubbing
them with snow, and thus, very gradually, restor-
ing them to a proper temperature, the evil con-
sequences of frost-bite were prevented.

Mortification from sudden Loss of Blood.

As the circulation of the blood is necessary for the maintenance of life, so, whatever for a considerable time prevents a part of the body from being supplied with blood, will produce mortification. A very copious blood-letting, for instance, will, under certain circumstances, give rise to it. I will mention a remarkable example, which fell under my observation some years ago, in a case which I attended, with the late Dr. Babington. The patient, a medical officer, in the East India Company's service, had gone out to dinner, and drunk an immense quantity of wine, so that he got exceedingly tipsy. This was in the city. He staggered up Holborn, as well as he could, and found his way into a chemist's shop. Here he was mad enough to ask the person who stood behind the counter to bleed him; and whether this person was tipsy or not also I do not know; but, however that might have been, he certainly did bleed him; and not only that, but the two blockheads agreed that he could not be bled too freely; and the drunken man lost, I believe, not less than three pints of blood. He then became exceedingly ill; was carried home in a coach; and the next day both his feet were mortified, from the extremities of the toes to the instep. We gave him wine, and nourishment, and he recovered; the sloughs separating, the dead bones coming away, and the stumps of the feet healing.

Mortification from Inflammation of Arteries.

Any thing which obstructs the passage of blood completely through the arteries of a limb will, of course, produce mortification. A single ligature, placed on an artery, does not do so, because it obstructs the main trunk only at one point, and there are anastomosing vessels communicating with the artery above and below the ligature, which are sufficient to carry on the circulation. But, suppose that, instead of one ligature, you were to put on half a dozen, at different distances from each other, in the space of six or seven inches of the artery, you would not only render the arterial trunk, but the anastomosing branches also, incapable of carrying on the circulation; and this would produce gangrene. I imagine that such a thing never was done by a surgeon upon the human subject, but something corresponding to it may happen from disease. As long ago as when I was house-surgeon in this hospital, I went to see a poor man at Brompton, under the following circumstances. On a very hot summer's day, in August, he was walking in the fields, when he felt a sense of pricking, numbness, and weight, as he described it, in both lower extremities. It was with great difficulty that he crawled home. In one of the lower extremities these sensations subsided, but not so in the other. On the following day, the whole of the limb, from the toes to the middle of the thigh, was in a state of mortification. The mortification never extended afterwards; no vesications formed on the foot; it was not swol-

len, and no part became putrid, except just a little in the middle of the thigh, where there was a great mass of soft parts. The limb dried, the skin assuming a brownish colour, being, at the same time, hard and semi-transparent, so that the white tendons could be seen shining through it. It was, in fact, what has been called a case of dry gangrene. The poor fellow went on very well for four or five weeks, without any bad symptoms, during which time the separation of the dead parts in the thigh had made considerable progress. But it was more than nature could accomplish to complete the work. His powers, at last, began to fail, and he died at the end of six weeks from the commencement of the attack. I examined the body, and found marks of inflammation everywhere about the principal artery and vein of the limb. From the bifurcation of the iliac trunk down to the middle of the thigh, the artery was obliterated, being completely filled with coagulated lymph, evidently effused from inflammation, closely adhering to the inner surface, but with some admixture of red coagulum. The vein also was filled with lymph, and obliterated in the same manner as the artery. There had been inflammation of the sheath of the vessels, in consequence of which the artery and the vein adhered closely to each other, and to the surrounding parts, so that the dissection was somewhat difficult. The nature of the case seems to be plain enough. There had been inflammation of the artery and the vein, and the obliteration of the artery was to so great an extent as to cut off the supply of blood, not only through the trunk,

but through the anastomosing branches. Some
years ago, I was called, with Sir Charles Clarke and
Mr. Bryant, of the Edgeware Road, to see a case ap-
parently similar, which terminated more fortunately.
A lady, without any evident reason, was seized,
all at once, with pain in one groin, and down the
anterior and inner part of the thigh, with great
tenderness in the course of the femoral artery.
When I first saw her, which was not till some
days afterwards, the whole leg below the middle
was in a state of mortification. There was no
œdematous swelling of the foot, and no vesication.
She had still pain in the course of the femoral
artery, which was aggravated by pressure ; and
the pulse could not be felt in any part of the
limb. Considering the resemblance of this case
to the one which I have just mentioned, I could
entertain no doubt that the disease was the
same, and that the mortification of the leg was
the consequence of arterial inflammation. After
some time the soft parts began to separate, until,
at last, the lower part of the leg and the foot
remained attached to the rest of the limb, merely
by the tibia and fibula. I sawed through these
bones, after which the parts gradually healed,
forming a very fair stump. Perhaps you will ask
why I proceeded in this manner, instead of ampu-
tating the limb at once. The fact is, that I
remembered a case, published in Saviard's Obser-
vations on Surgery, (Saviard was a celebrated
French surgeon in the early part of the eighteenth
century,) which was very similar to this which I
have just mentioned, and in which he amputated

the thigh. In performing the operation, he was surprised to find that no blood flowed from the stump, in consequence of the vessels being obliterated. The parts divided in the operation had not a sufficient supply of blood for the healing process. The stump mortified, as the leg had done before, and the patient died. It appeared to me, after the evidence afforded by this case, that it was desirable to avoid an operation, if possible. At the same time, I ought to mention, that in the second volume of the Medical Observations and Inquiries, there is an account of another case of the same kind, in which amputation was successfully performed, the stump healing favourably.

One of the circumstances most deserving of notice in these cases is, that the limb mortifies to a certain extent, and that then the mortification stops. This, however, is easily explained. We know that the obliteration of an artery must prevent the supply of blood to certain parts, but no further. Another peculiarity is, that the parts become dry, hard, horny; which condition of them has given rise to the name of dry gangrene. This is easily explained also. If mortification be the result of inflammation or of venous obstruction, there is always an effusion of serum, before the parts completely die, in the form of vesication of the skin and œdema of the cellular membrane; and then, when the parts die, being infiltrated with serum, they readily become putrid. But here the supply of blood is cut off; the blood is prevented from entering the limb, so that there can be neither vesication on the surface nor effusion of serum into

the cellular membrane ; and the dead parts dry readily from the absence of moisture. M. Dupuytren has described the gangrene that occurs in old age as the result of arterial inflammation, but I am quite satisfied that he is mistaken on this point. Gangrene from arterial inflammation is a comparatively rare disease, and may occur at any period of life ; whereas the gangrene of old age arises, as repeated dissections have enabled me to determine, entirely from other causes. I shall offer some observations on this kind of gangrene in the next lecture.

LECTURE XIX.

Senile Gangrene.

PERSONS advanced in life are liable to mortification
of the toes and feet; generally beginning in the
former and extending to the latter. By persons
advanced in life I mean those who bear upon them
the marks of old age, which may, however, occur
at various periods of human existence. One of
the worst cases of mortification of the toes which
I ever witnessed, connected with what might truly
be considered old age, occurred in a man of six-
and-thirty, worn out by the operation of bad
habits upon an originally bad constitution.

The question here arises, *in limine*, Why is it
that elderly persons are liable to this disease?
The answer is furnished by morbid anatomy.
I have examined the bodies of a great many old
persons who have died with mortification of
the toes, and I have always found some morbid
condition of the arteries of the affected limb. In
the very great majority of cases there is extensive
ossification of the arteries of the thigh and leg;
in many cases they are not only ossified, but some
of them are contracted and obliterated. Such, in
some instances, is the condition of the femoral

artery in the middle of the thigh, even for some
inches of its course. In other cases, one or more of the
arteries of the leg are obliterated, while the femoral
artery is still pervious. In one case, of which I have
preserved notes, there was no ossification of the ar-
teries anywhere, but the femoral artery was converted
into a gristly cord, so as to be quite impervious
from the origin of the *profunda* to the point at
which it perforates the tendon of the great head
of the *triceps adductor* muscle. In none of these
cases, in which the arteries were contracted and
impervious, were there any such appearances as
would have indicated that the contraction had
been the result of previous inflammation; and
it appeared to me that the change which had
taken place in their condition was best to be
explained by supposing it to be the result of a
contractile process, analogous to that which pro-
duces a permanent stricture of the urethra or
œsophagus.

It has been said that mortification of the toes in
old persons is often the result of disease in the
heart itself. This does not, however, exactly
correspond with the results of my own experience.
It is true, that I have known persons who had
disease in the heart to die of mortification of the
toes; but then there was always enough in the
condition of the arteries of the limb to account
for the mortification, independently of the other
disease. Thus, in one case in which there was
mortification of the right foot, the muscular struc
ture of the heart was soft, thin, flaccid, and easily
torn, and one coronary artery was impervious;

but the right iliac artery, for the extent of three inches, was impervious also, in consequence of it being completely choked by a mass of firmly coagulated blood. In another case, in which there had been mortification of the right foot, the muscular structure of the heart was pale and flaccid; one coronary artery was contracted and impervious; the cavities were dilated, and a mass of dense coagulum, resembling that found in the sac of an aneurism, occupied the appendix of the left auricle; but there was a similar coagulum obstructing the popliteal artery and vein of the right side, and extending some way down the branches of those vessels in the leg.

You are not, however, to suppose that mortification of the toes is a necessary consequence of ossification or obliteration of the arteries, and that it occurs in all such cases. I have no doubt that many persons have the arteries thus altered in structure for many years, although mortification never supervenes. I have already explained to you, that, in some instances, the arteries are ossified, and at the same time either contracted or obliterated; that in others they are obliterated without being ossified; and again, that in others they are ossified without being obliterated, even retaining their natural diameter. It is evident that the quantity of blood admitted into the limb must be different under these different circumstances, and that the liability to mortification must vary accordingly. But further than this: even where the arteries are rendered narrower, or actually obliterated, it seems that in general some-

thing more must happen to bring on mortification;
and you will almost invariably find that the imme-
diate cause is an attack of inflammation. Perhaps
the following is not an unreasonable explanation
of the phenomena which occur. The arteries are
ossified, or they are partially obliterated, but still a
sufficient quantity of blood for ordinary purposes
enters the limb. By and by, from some cause
or another, the foot becomes inflamed. I observed
to you, in a former lecture, that during inflam-
mation an increased supply of arterial blood seems
to be required, and that the arterial trunks leading
to the inflamed part become dilated, so as to allow
this increased quantity of blood to enter; but if
the arteries are ossified they lose the power of
dilatation; the greater supply of blood required in
consequence of the inflammation is withheld, and
so the part perishes.

You might suppose, à priori, that persons in the
lower condition of life, who live by their daily
labour, and suffer bodily privations, would be
more liable to mortification of the toes than other
persons; but such is not the case; at least it has
fallen to my lot to see comparatively few examples
of this disease in the hospital, whereas, in private
practice, I have met with a great number; so that
for one case under my care in the former, I have
had at least three or four in the latter. It is one
of the many penalties paid by those who enjoy the
advantages of ease and affluence, and who live
luxuriously. Those who drink too much fer-
mented liquor, and do not take sufficient exercise,
but more especially those who are overfed with

animal food, are the persons principally afflicted
with this disease, and not the labouring poor.

Ossification of the arteries is a change that can
take place only gradually ; and the obliteration
of them being for the most part the result of a
gradual process also, you will easily believe that
certain præmonitory symptoms may arise in the
lower limb before the disease is gone so far as to
produce mortification. If you cross-examine a
patient who has mortification of the toes, he will
generally tell you, that for three or four years
preceding, he has had occasional pains in the
lower limbs ; a sense of numbness in them ; that
his feet were liable to be cold ; that when they
again become warm, after having been cold, they
have been very painful ; and that he has had a
sense of weakness of the muscles. Such patients
walk a short distance very well, but when they
attempt more than this the muscles seem to be
unequal to the task, and they can walk no further.
The muscles are not absolutely paralyzed, but in a
state approaching to it. The cause of all this is suffi-
ciently obvious. The lower limbs require sometimes
a larger and sometimes a smaller supply of blood.
During exercise a larger supply is wanted on
account of the increased action of the muscles ; but
the arteries being ossified or obliterated, and thus
incapable of dilatation, the increased supply cannot
be obtained. This state of things is not peculiar
to the lower limbs. Wherever muscular structures
exist, the same cause will produce the same effect.
Dr. Jenner first, and Dr. Parry, of Bath, afterwards,
published observations which were supposed to

prove that the disease which is usually called *angina pectoris* depends on ossification of the coronary arteries. I will not say that such symptoms can arise from no other cause, but I know that they do arise from it in many instances. In examining the bodies of persons who died from the disease in question, I have sometimes found ossification of the coronary arteries to so great an extent, that they were converted into complete bony tubes, while there was no disease of any consequence besides. When the coronary arteries are in this condition they may be capable of admitting a moderate supply of blood to the muscular structure of the heart; and as long as the patient makes no unusual exertion, the circulation goes on well enough; when, however, the heart is excited to increased action, whether it be during a fit of passion, or in running, or walking up stairs, or lifting weights, then the ossified arteries, being incapable of expanding so as to let in the additional quantity of blood which, under these circumstances, is required, its action stops, and syncope ensues; and I say, that this exactly corresponds to the sense of weakness and want of muscular power which exists in persons who have the arteries of the legs obstructed or ossified.

The insufficient supply of blood to the limb sufficiently explains also the sense of numbness, which I mentioned as one of the præmonitory symptoms of the disease. We must refer the pains of which the patient complains to the same source. With respect to the latter symptom, I may further

observe, that it exists in very different degrees in
different cases. Sometimes the pains are slight, and
at other times very severe. There may be pain
in the toes, or pain in the heel, without any other
manifestation of disease. The pain becomes ex-
cruciating, and it never ceases. The disease is
called *neuralgia*, which means nothing. No
remedy gives any relief, unless it be large doses
of opium ; and at the end of six or twelve months
mortification of the foot takes place. I have
already observed that what seems to be an acci-
dental attack of inflammation is often the imme-
diate forerunner of the mortification.

A very frequent occurrence is this. A patient
cuts a corn; the knife penetrates too deep,
and causes the toe to bleed, and a little inflam-
mation follows ; or, it may be that the foot
is chilled by exposure to cold, and the patient
goes to the fire to warm it, and that this is
followed by a degree of inflammation, which, if
the arteries were healthy, would be a chilblain
and nothing more, but which, in their present
condition, lays the foundation of mortification.
Then, vesications take place ; and when these
burst, you find, at the bottom of them, the cutis to
be dead. This may take place in one toe, or in
many toes at the same time. Most frequently,
the disease, having commenced in one toe, extends
to the others, and then to other parts of the foot.
Sometimes, even when there has been no pain
previously, there is intense pain at this period. At
other times the pain is trifling. With respect to this
symptom, both in the early stage of the disease

and afterwards, there is a great variety, such as it
is not very easy to explain. In inspecting the
mortified part you will always find that it has a
margin of inflamed skin, and that, as this extends,
the mortification follows it; the constitution being
probably little or not at all disturbed, the pulse
remaining at its natural standard, and the patient,
in all other respects, thinking himself well. The
disease, in fact, generally shows itself in the first
instance in a chronic form. Occasionally, how-
ever, it is otherwise, and it exhibits all the
characters of an acute disease. The man to whom
I alluded in the beginning of this lecture as old
in constitution though not in years, being only
thirty-six years of age, had been a soldier, and
had served in Canada and in the East Indies,
that is, in cold climates and in hot; he had by his
own acknowledgment been a drunken fellow, and
dissipated in other ways. Having been dismissed
from the army as superannuated he gained his
livelihood by working as a labourer in the Edgeware
Road. Many times, on going to work, he suffered
from cold and numbness of the feet, followed by
violent pain. One morning in September, (not a
very cold time of the year,) these sensations took
place to a very great extent, severe pain and
shivering followed, and his friends took him home
in a coach. Two days afterwards he was brought
to the hospital, and then all the toes of one foot
were mortified, and one or two of the other.
Under the treatment which was employed, and
which I need not explain at this moment, he
recovered. The dead toes came away, the sores

healed, and he left the hospital as cured. Two years afterwards he was re-admitted, having had an abscess on one instep, which had left a sinus extending some way under the skin. This occurred the year after I had been elected assistant-surgeon to the hospital; and not knowing better at that time, I introduced a director under the skin, and slit open the sinus with a lancet, making an incision two inches in length. I need not tell you that, with my present experience, I should have acted otherwise. Some inflammation followed the wound, which spread over the whole foot. The next day there was an extensive mortification; the pulse was frequent and weak, the skin hot, and the patient lay in a state of stupor. Two days afterwards he died. You will observe that, in each of these attacks, the disease had the acute form, and that in the second attack it terminated life in about four days. I examined the body after death, and found extensive ossification of the arteries of both lower limbs.

In the more ordinary cases, the disease having the chronic form in the first instance, nevertheless, if it goes on, assumes the acute form afterwards. The mortification may slowly spread up the toes and feet, without any urgent symptoms, and this may be going on for weeks, and even for months; then, all at once, a fresh attack of inflammation takes place, the mortification extends rapidly, the constitution suffers, the pulse becomes feeble and rapid, the patient falls into a state of stupor, and dies in the course of a few days.

There is no form of mortification which is more

dangerous than that of which I am now speaking.
A large proportion, indeed, of the patients who are
so affected, under any mode of treatment, die.
You will not be surprised, that, under these
circumstances, a great many different modes of
treatment have been proposed. Where there is a
disease that always gets well under a certain
system, medical men have little inducement to
make experiments; and those whose greatest
anxiety it is to cure their patients make none at
all. But in an intractable disease like this it is
natural that practitioners should be always looking
out for new remedies. I do not propose to speak
of all the variety of remedies that have been
used or recommended; but I shall allude to the
principal ones.

In the first place, those who have observed that
the disease is preceded by inflammation, have said,
" Bleed the patient; treat it like an inflammatory
" disease." I have no doubt that some have been
led to recommend this, from a mistake respecting
the pathology of the disease which I noticed in
the last lecture; that is, from having supposed
that this peculiar kind of mortification of the toes
depends on inflammation of the arteries. I have,
however, explained to you that the two cases are
quite different. I have seen one case in which
the experiment of blood-letting was tried. The
mortification was to a very small extent; there
was very little inflammation round it, and the
patient seemed to have a very fair chance of
recovery; but immediately after the bleeding the
mortification proceeded rapidly up the foot, and he

died. Indeed, it appears to me, that we have no right to expect that this mode of treatment should be successful. There is inflammation, it is true; but if the inflammation terminates in mortification, it is because the part, on the principle which I formerly explained, cannot obtain that additional supply of blood which an inflamed part requires. Now, if you abstract blood, and thereby lessen the quantity in the system and weaken the action of the heart, the supply of blood to the limb must be diminished, and the cause of the disease aggravated.

An opposite plan of treatment to this has been recommended by others. They have said, " This is " a disease of weakness; give bark, quinine, ser- " pentaria, and other tonics." Now there are certain kinds of debility which will be relieved by these remedies, but here there is only a local weakness, depending on disease of the blood-vessels Will such remedies as these mend the condition of the arteries?   Certainly they will not; but they will interfere with the digestion; they will prevent so much food from being converted into nourishment as would be converted into it otherwise; and they will interfere with the exhibition of stimulants, which really are useful, as I shall explain presently. I own that I have very little—I may almost say no—faith, derived either from theory or from practice, in the good supposed to be produced by the exhibition of what are called tonics. If you give any thing of the kind, let it be ammonia, combined with the compound infusion of orange peel. Ammonia exhibited for a short time

may be useful ; but I think that there are objections to its long continued use in this and in every other case. It appears to me that patients who take it for a long time are at last rendered weaker by it instead of stronger. It is an alkali, and produces the same effect on the blood that is produced by other alkalies. If given at all it should be only for a short time, and then it may be useful.

In the management of these cases there can be no doubt that one principal object to be kept in view is the maintenance of a sufficient supply of blood in the system. As the abstraction of blood is mischievous, so the opposite treatment is likely to be beneficial. Let the patient, then, be put on a system of nutritious diet, not overloading his stomach, so as to produce a red or yellow sediment in the urine, but taking as much food as can be easily assimilated, and no more. Let him live chiefly, but not entirely, on animal food, which makes blood — if I may use the expression — of a better or stronger quality than that derived from vegetables alone. In addition to this administer some such stimulants as ale, wine, or brandy. You will generally find that persons who have mortification of the toes have been accustomed to take a good deal of fermented or spirituous liquor, and, being accustomed to it, that they cannot do without it. Nor is this all. Those whose mode of life has been different will require the exhibition of stimulants under these new circumstances. The question, however, will arise in each individual case, What is the proper quantity to be exhibited ? Some persons may

want a bottle of one of the stronger wines daily; but very few, on this, or on other occasions, are benefited by so large an allowance as this. In the majority of cases, from the third of a pint to a pint daily will be sufficient. You should ascertain what have been your patient's previous habits, and then give him stimulants cautiously, observing the effect produced. There is one good rule of conduct in this respect, both in health and in disease; any quantity of wine that does not occasion heat of skin, nor raise the pulse, nor make the mouth clammy, nor render the patient nervous or irritable, may be given with advantage; but whatever does more than this does mischief.

In all cases of mortification of the toes it is of great consequence that you should attend to the state of the digestive organs. If the bowels are not in a proper state, the food cannot be properly assimilated; and the patient being confined, as he must be, to his bed, the bowels will not act without assistance. I do not advise you to give purgatives daily, but rather an active dose may be required once in three or four days, such as two or three grains of calomel at bed-time, with an aperient draught on the following morning, or blue pill with the compound extract of colocynth; and all my experience leads me to believe, that this is a very essential part of the treatment.

Mr. Pott was either the first who recommended, or the first who brought into general use, the exhibition of opium in cases of senile gangrene. What is the *modus operandi* of opium here I will not pretend to say; but I have no doubt that in

reality no internal remedy is so useful as this. I can scarcely remember, in my own practice, a single case of recovery in an old man affected with mortification of the toes, in which opium had not been exhibited. But it is with opium as with wine ; a good deal of discretion is necessary as to the exhibition of it. You must not begin with very large doses, which would overpower the constitution, and keep the patient dozing through the day. You may at first exhibit half a grain three times daily, and keep him slightly under its influence, but nothing more. If he continues to take it, (and sometimes this may be necessary for months together,) the dose will require to be increased ; but you will never be able to persevere in the use of opium except you employ, in combination with it, the remedies which I last mentioned. In these and in all other cases in which opium is taken daily, not only purgatives, but mercurial purgatives are necessary, otherwise it stops the secretion of bile, and does mischief. If I am not greatly mistaken the result of a particular case will very much depend on this,—whether opium does or does not agree with the patient. If it induces a feverish state of system, if it disturbs the sensorium, if it interferes with the digestion of the food, and especially if it cause the tongue to become brown and dry, it can do no good ; while the more healthy action of it will be almost certainly beneficial.

With respect to the local treatment, the first thing is to keep the patient in bed. Not feeling very ill, he probably will wish merely to lie on the

sofa; but this never answers; therefore send him to bed at once; if he strives against it for the first few days, he will be driven to bed at last, and will be worse off than if he had submitted in the first instance. Much indeed of the success of the treatment will depend on his being placed in the uniform warmth which a bed affords at the very commencement of the attack. Then, what local treatment is required besides? It is common to apply poultices made of the grounds of stale beer, or of red wine and oatmeal, and some recommend a solution of chloride of soda. I was accustomed formerly to rub the legs and thighs with a stimulating liniment, but I soon left off this practice, finding that it did no good; and I believe now, that if it does any thing, it does harm. The toes mortify because they do not get a sufficient supply of blood. Rub the thigh and leg with a stimulating liniment, and it is the same thing, only less in degree, as blistering them; and what would be the consequence of applying blisters? They would draw the blood to other parts. It is wanted in the foot and you draw it elsewhere. It is something like taking blood from the arm,—not indeed so mischievous; a mistake less in degree, but the same in kind. Whether this view of the matter be correct or otherwise, I am certain that I have never seen any good results in practice from this kind of treatment. Nor have I any reason, from what I have seen, to believe that those other applications which I have mentioned used, as poultices and lotions, are of any service.

Some few years ago, I was in consultation with

the late Mr. Vance, of Sackville Street. He had
been surgeon, for many years, to Greenwich Hos-
pital. Being always anxious to obtain what infor-
mation I can from others, I observed to him:
" You must have seen, among the old men at
" Greenwich, a great number of cases of mortifi-
" cation of the toes. What have you found, on
" the whole, to be the best local treatment?
He answered, that he had found nothing to answer
so well as wrapping up the parts in carded wool.
I did not understand from him whether he wrapped
up merely the foot or leg, or the whole limb; but,
he added that he usually left it on for many days
at a time. It struck me that this was a very rea-
sonable kind of practice. Wool is a very bad
conductor of heat, and, wrapped round a limb, it
must keep it of very uniform temperature, and, at
any rate, save, in a great degree, to the consti-
tution, the expense and trouble of generating
animal heat. Soon afterwards, I had an oppor-
tunity of adopting Mr. Vance's mode of treatment.
I had been poulticing a foot as usual, and the
disease was going on, spreading from one toe to
another, and up the foot. Carded wool is so pre-
pared that it may be drawn out in long flakes,
several feet in length, and in these I wrapped up
the foot; and then, thinking that I had better
proceed further, I wrapped up the leg, and the
thigh also, as high as the middle of the thigh. I
applied it rather loosely, one flake over another,
until the limb appeared to be three or four times
more bulky than it was in its natural state. The
result was excellent. The mortification never

spread, from the time that the wool was applied, and the patient recovered. I have employed the same local treatment since in many other cases; and although, of course, it would be absurd to represent it as always successful, yet I am bound to say, that it has produced much better results than any other which I have ever employed.

In using the wool, recollect that you should apply it loosely and uniformly, and plenty of it. You may afterwards sew it all up in a silk handkerchief, and leave it unopened for several days; sometimes for a week. A simple dressing of calamine cerate may be laid on the mortified parts, being replaced whenever you change the wool. If the mortification stops, and the slough is separating, you may, on account of the discharge which takes place, change the wool every other day. The carded wool possesses, as a little consideration will prove to you, many advantages over the poultices. In the first place, if you use poultices, the limb is exposed alternately to cold air and hot poultices three times every twenty-four hours; that is, to repeated changes of temperature. It is only in the intervals that the heat is preserved. But if you wrap it up in carded wool, the alternate exposure to heat and cold, and the waste of animal heat, are altogether avoided. In another respect, also, this mode of treatment is a great comfort to the surgeon, the patient, and the whole family. Two or three times daily, whenever the poultices are changed, the family inquire, "Is he "better? is he worse? is the mortification "stopped?" You are called upon to answer these

unanswerable questions, and the patient's mind is kept in a constant state of excitement. But if you put on the carded wool, and leave it there for some days, his mind in the interval is tolerably tranquil; he lives upon the hope that when the wool is next taken off the parts will be found better; and such a state of mind is much more favourable to his recovery than the nervous anxiety which he experiences when the limb is examined more frequently. I believe that there are a very few cases to which you will not find this method of treatment applicable. If there be any, it is those in which there is great inflammation and heat of skin; and in these it may be prudent to defer the application of the wool until these symptoms are abated.

Whenever the mortification is arrested, you will be made aware of it by a line of separation on the margin. The process of separation proceeds, in favourable cases, until the bones of the toes come away. You may have to cut through some dead ligaments and tendons, in order to promote the separation of the offensive and putrid parts, but you must cut through nothing else. If you apply your knife to living parts, you will probably bring on a fresh attack of mortification. Leave the separation altogether to the natural process, which will do all that is required.

But there is another question. A man has mortification of the toes; and, independently of experience, you might naturally say, Here is a most dangerous disease; why not at once amputate the limb? It is probably unnecessary for me to tell

·you that it would be contrary to the established
rules of surgery (for which I have great respect) to
amputate a limb under such circumstances. I have
never seen it done ; I have never done it myself ;
but I have heard of cases in which the surgeon
was—shall I say—thoughtless enough, or ignorant
enough ? to venture on this summary proceeding
of cutting off the leg, because the toes were
beginning to mortify. In every instance the stump
mortified, and the patient died. The chance of
recovery from mortification of the toes is not very
considerable ; that is to say, there is a great chance
of the patient dying ; but still, under proper treat-
ment, there is also a fair chance of recovery, and
you ought not to risk this chance by inflicting on
the diseased limb so severe a local injury as belongs
to amputation.

I have told you that disease of the arteries lays
the foundation of mortification, but the disease
may exist many years without mortification super-
vening, until some accidental circumstance brings
on inflammation. I have known persons with dis-
ease of the arteries, and several toes mortified in
consequence of it, in whom the mortification has
stopped, the sloughs have separated, the sores
have healed, and who have lived for years after-
wards. I know a gentleman who is now alive, and
in good bodily health, at least he was so not long
since, whom I attended for mortification of the
toes nearly five years ago. This patient was treated
by the application of carded wool, and I cannot but
suspect that it did something more than relieve
the disease at the time. At all events, it may be

admitted as a question, whether the keeping the limb wrapped up in the carded wool, which is like keeping it in a vapour bath, may not ultimately produce some beneficial change in the condition of the diseased arteries; not indeed removing the phosphate of lime, which is deposited in their structure, but leading to their becoming gradually and slowly expanded, so as to allow of a more liberal supply of blood to the limb. Whether this suspicion be or be not well founded, I suppose that no one will doubt that it will be prudent in all cases to advise the patient after his recovery always to wear a thick fleecy hosiery stocking; or to use some other kind of warm clothing, with a view to preserve the limb from the influence of the external cold.

I must add a very few words respecting the treatment during the process of separation of the dead parts. Bark, quinine, and other tonics, may be proper now, though they were not so before. Wine and a generous diet are still required; and some stimulating dressings, such as the *unguentum elemi compositum*, may be useful applications to the sores.

LECTURE XX.

ON MORTIFICATION—*continued.*

Mortification of the Integuments of the Leg.

THERE are cases of mortification of the integuments
of the legs which appear to correspond very nearly
to those of mortification of the toes, of which I
treated in the last lecture.   There is, however,
sufficient difference between these two classes of
cases to justify me in noticing them separately.
Mortification of the integuments of the legs is of
more frequent occurrence than mortification of the
toes.   We meet with it earlier in life, and in those
who have less distinct marks of old age upon
them; at the same time that the chances of
recovery are greater in the former than they are
in the latter.   Undoubtedly, mortification of the
leg (as well as mortification of the toes) frequently
has its origin in organic disease of the vascular
system.   But then I find reason to believe that it
takes place in many cases independently of organic
disease of any kind,—as in persons who are merely
lowered and exhausted by previous illness, and
whose heart does not act with sufficient power,
because it partakes of the general debility.   Such
persons may and do recover perfectly, living for
years afterwards without any symptoms of organic
disease showing themselves.

Let me not, however, run the risk of misleading you. As the more fortunate cases of which I have just spoken do not include the whole of those which you will meet with in practice, so, when you are first called to a case of this kind, you must always look at it, in the first instance, with anxiety and suspicion.

A person comes to you with a vesication on the leg, and when the cuticle has given way you find a small slough at the bottom. The slough may go on spreading, probably very slowly, and with little or no suffering. By and by there is an attack of severe pain, with surrounding inflammation, and perhaps a rigor. In a day or two after this the mortification is found to be making greater progress. In bad cases the mortification spreads with frightful rapidity, with much constitutional disturbance. The pulse becomes irregular, feeble, intermittent; the tongue is dry and brown; the patient wanders in his mind, then becomes comatose, sinks, and dies. Such is the history of one of the worst cases of mortification of the skin of the leg; corresponding, you will perceive, a good deal in the symptoms to those of senile mortification of the toes. There is a chronic attack of the disease at first, with little constitutional disturbance, the mortification spreading slowly; the disease afterwards assuming an acute form, and in a short time terminating life. But, in other more fortunate cases, the mortification goes on spreading slowly with little or no suffering, with no great constitutional disturbance, and at last, under proper treatment, stops, the slough

comes away, the sore granulates and heals.   As I told you before, the patient who has suffered in this manner may possibly live for years, and have no return of the disease.

Sometimes the disease appears in a somewhat different shape ; there is a simple varicose or other ulcer of the leg ; by and by the surface of the ulcer assumes a dark colour, the granulations die, the mortification extends to the skin at the margin, and spreads slowly or rapidly, according to circumstances.   Perhaps the slough may separate, the sore begin to heal, and actually heal to a certain point, then mortification may begin again and go on to a certain extent, and then stop a second time.   In this way I have known the disease to linger on for a year or more, sometimes terminating well at last, and at other times terminating unfavourably.

The treatment of these cases is very similar to that of the cases which I noticed in the last lecture, and, therefore, I need not occupy your time long with this part of the subject.   The patient ought to be kept in the recumbent posture, in the uniform warmth of bed.   This I conceive to be a most essential part of the treatment, though it may sometimes require a considerable effort of your persuasive powers to carry it into execution. I have known patients thus afflicted walk to my house to see me, and have had great difficulty in persuading them that they were sufficiently indisposed to make even confinement to the house necessary.

With respect to the local treatment ; in the

greater number of cases, I find none to answer
so well as this: apply some simple dressing
(calamine cerate for example) to protect the part,
and then wrap up the limb in carded wool, in the
way which I explained in the last lecture. This
should be left undisturbed, in the first instance,
for several days, the period, however, varying
afterwards according to the quantity of discharge.
There are a few cases to which this treatment is
not at first applicable; I allude to those in which
there is a good deal of surrounding inflammation,
and great heat of the limb. Under these circum-
stances the sufferings of the patient may be
aggravated by keeping the limb wrapped up in
wool. The part then requires to be kept cool,
and you may apply a piece of lint dipped in water
and kept constantly moist, or a simple poultice.
The water dressing, however, is the simplest
application, causing the least trouble to the patient,
and is, at any rate, as effectual as the poultice.
But here also there is a period, when the heat and
pain have in some degree subsided, in which you
may have recourse to the other treatment. When
the slough has separated, a broad ulcer is left,
seldom very deep, and often quite superficial, and
for the treatment of this no specific rule can be laid
down. Usually, the sore does not require any
very stimulating application. I have found, on
the whole, the Barbadoes naphtha (if it be genuine)
a better remedy for the ulcers left after the slough
has separated, than any thing else. It is a mild
and soothing application, yet it has a great ten-
dency to clean what we call a foul ulcerated sur-

face. It is applied thus: you dip lint in it, lay it
upon the surface of the sore, place a piece of oiled
silk over it, and then apply a bandage, not very
tight. This may be changed once, and under
certain circumstances twice, daily. If the limb be
cold, and the circulation in it feeble, you may
continue to apply the carded wool, or a thick
fleecy hosiery stocking, after the slough has
separated; and in general it will be prudent for
the patient to wear a warm stocking ever after-
wards.

With regard to the constitutional treatment,
your first attention must be directed to the state
of the digestive organs. Generally, in these cases
the patient requires an occasional purgative;
that is, once in four or five days, or once in a
week, according to circumstances. I have given
bark and other tonics, ammonia, and so on; but
with respect to such remedies I may refer you to
the observations which I offered when speaking
of mortification of the toes. It is most essential
that the patient's stomach should be able to digest
food, and you should take care not to overload it
with medicine if it interferes with his food, which
is very much better than medicine. Wine is
generally required, except just at the period when
there is much inflammation and pain in the leg.
With respect to this also, I may recal to your minds
what I said in the last lecture. Opium in these
cases is, according to my experience, very service-
able, as it is in cases of mortification of the toes,
but subject to the same careful observation and
restrictions. If it makes the tongue dry, if it

interferes with digestion, it does harm; but otherwise it does great good. You may exhibit it at first in moderate doses, increasing them according to circumstances, and always bearing in mind, that when you have occasion to exhibit opium, mercurial purgatives will be especially required. When the sore has become quite clean and healthy, you may apply stripes of diachylon or soap plaster in a circular manner round the limb, with a bandage from the toes to the knee, treating it as you would treat other sores of the leg.

Peculiar Species of Dry Gangrene of the Skin.

The wax model which you see on the table exhibits the appearances of a very peculiar sort of mortification, which is not well described, so far as I know, by surgical writers. If I recollect rightly, however, there is a brief notice of a case of this kind in M. Quesnay's book on gangrene, — a very excellent work, published by an eminent French surgeon about the middle of the last century.

I have extracted from one of my old note-books the history of the first case of the kind that I met with; and I shall read it as it here stands, believing that I can adopt no better method than this of conveying to you a knowledge of this disease.

" Susan Orange, a girl fourteen years of age,
" was an out-patient of the hospital, under my
" care, in October 1812, on account of some
" kind of eruption of the skin of the left
" arm. She appeared full grown, but had never

" menstruated. She had a pale sallow complexion,
" with a very feeble pulse, altogether exhibiting
" marks of a very languid state of the system.
" About the end of February 1813, the eruptions
" became very much relieved." (Of this early part
of her case I have only some short notes; and
it is not even stated what was the exact cha-
racter of the eruption. Whatever they were they
did not exist to any very great extent.) " Almost
" immediately after the eruptions in the arm had
" disappeared, in the beginning of March 1813,
" she was seized with pain, confined to a single
" spot on the left fore-arm. The pain lasted three
" hours, and then subsided; but that part of the
" skin of the fore-arm to which the pain had been
" referred, and which was of about the extent of
" a shilling, was left with a white and shrivelled
" appearance. It was, in fact, dead; and, in a
" short time, the dried skin became hard and
" horny, of a straw colour, somewhat resembling
" a piece of parchment in appearance. As it
" dried, the small vessels in the skin became
" apparent, injected with red blood in a coagulated
" state. In a few days the slough separated,
" leaving a very superficial sore, which granulated,
" and healed under some simple treatment. But
" before this sore was well closed, the patient had
" a second attack of pain referred to the margin
" of the cicatrix, and this was followed by a
" second slough very similar in appearance to the
" first. There was, however, this peculiarity in it,
" that, while it formed a complete zone or circle
" round the cicatrix, it was at some little distance

" from it, there being a narrow band of sound skin
" left between them. This second slough gra-
" dually separated, and the sore which it left
" healed ; but before this process was completed,
" there was a third attack of pain at the margin
" of the second cicatrix. A third slough formed,
" nearly similar to the last ; that is, presenting
" the appearance of a zone, with an intermediate
" zone of sound skin between it and the last-
" formed cicatrix. The sore left by the third
" slough healed like all the others. On the 9th
" of May there was another attack of pain, re-
" ferred to another spot on the inside of the left
" fore-arm. It lasted a day and a night ; was more
" severe than on the former occasions, and was
" followed by the destruction of a piece of the
" skin, two inches in diameter. The slough pre-
" sented the same appearances as the former ones,
" and came away at the end of a fortnight, being
" of the thickness of a crown piece. It left a
" sore, which healed, but slowly. About the
" middle of May she began to experience a slight
" pain upon one instep, which continued ; and on
" the 4th of June this pain became very intense,
" entirely preventing sleep on the following night.
" On the morning of the 5th of June the pain had
" subsided, but a slough was formed as large as
" the palm of a man's hand, covering the greater
" part of the instep, which presented the same
" appearances, and ran the same course, as those
" on the fore-arm, except that the separation of the
" slough, and the healing of the sore, were more
" tedious than had been the case in the upper

" extremity. After this no fresh sloughs formed
" for a considerable time, though the patient con-
" tinued in the same feeble state of health. She
" left the hospital, and I lost sight of her until
" October in the same year, when she was ad-
" mitted into the physicians' ward, under Dr. Warren.
" She remained there for a considerable time in
" very weak health, with occasional formations of
" the same white cutaneous sloughs in different
" parts of the body. At last she quitted the
" hospital, and I lost sight of her altogether. But
" Mr. Hammerton, of Piccadilly, who was apothe-
" cary of the hospital at the time, informed me
" that she went to stay with some friends who
" lived near Windsor." I have reason to believe
that she died there, and that there was no post-
mortem examination.

The model which you see on the table was taken
from a patient of Mr. Keate's, and it very accu-
rately represents the peculiar appearance which the
sloughs assumed in the case of which I have given
you the history. You see the disease in its various
stages; some of the sloughs are recently formed, and
in other places they have separated, and there is
a clean granulating ulcer. The only circumstance
that I remember to have been different in the case
of Susan Orange, is, that there the vessels injected
with red blood in a coagulated state, and ramifying
through the white slough, were much more dis-
tinct than they are in this model. Mr. Keate's
patient became a great deal better, and it is sup-
posed that she ultimately recovered, under the
continued use of tonics. Tonics, and especially

steel, were administered to the first patient, whose case I have mentioned, without any advantage. I had a patient in the hospital who laboured under a disease very similar. This also was a woman with irregular menstruation. She was liable to attacks of pain in the leg, which ended in the formation of thin sloughs. The only difference between this and the other cases was that each slough was preceded by a vesication. The slough itself had the appearance which I have just described. This patient improved very much under the long continued use of small doses of sulphate of copper; but at last she left the hospital, and I lost sight of her : and, indeed, you must be aware that it is very difficult to get the whole history of one of these cases, or of other cases, in which the disease is protracted for a great length of time.

Mortification from the Ergot of Rye.

Cases of mortification of the limbs are described as arising from the use of certain deleterious articles of food, especially from eating bread made of blighted rye, or rye containing ergot. It is said that people who eat bread of this unwholesome kind are liable to mortification of the extremities ; and that whole families become affected with mortification under these circumstances. I have never seen any of these cases myself, and I cannot obtain from books any satisfactory information as to their pathology. I am not aware that there is any account extant of the appearances which they exhibit on dissection. I think it right to notice the subject ; but as I can tell you nothing more

of it than you can find in books I shall not dwell
upon it.

Mortification of the Extremities from unknown Causes.

In one of the earlier volumes of the Annual
Register you will find a very curious account of a
whole family becoming affected with mortification
of the extremities, though it is not stated that they
had been living on any deleterious articles of food.
The account is given by a physician in Suffolk of
a family in that county, and nothing is mentioned
which throws light upon the cause of the mys-
terious disease. The father, mother, and five
children, if I remember rightly, were all affected.
The lower extremities mortified in all except the
father, in whom the fingers only mortified.
Mr. Solly, in the two last volumes of the Medico-
chirurgical Transactions, has given the history of
a child, in whom one extremity after another,
without any evident reason, mortified. The disease
went on for twelve months, before it terminated
fatally. The limbs had all mortified, and sloughs
had separated ; a sort of natural amputation
having taken place. The child died, and the body
was examined after death, but the examination
threw little light on the pathology ; and the cause
of the disease is still mysterious.

In practice you will every now and then find
other forms of mortification, which it is impossible
to notice in lectures.

Anthrax or Carbuncle.

There is, however, one other form of this disease, which, I think, deserves your especial consideration, and with an account of which I shall finish this division of my course of lectures. The disease to which I allude is what is commonly called *anthrax* or carbuncle. There is something more to be said on this subject than upon ordinary cases of inflammation terminating in gangrene; and it is for this reason that, although I have referred to it in one of my former lectures, I shall again call your attention to it.

Persons who become affected with carbuncle are most frequently those belonging to the affluent classes of society; and such especially as have eaten and drunk a good deal, and lived freely, and have apparently enjoyed robust health, are liable to this disease, after they have passed the middle period of life. Dr. Prout has observed a very peculiar circumstance connected with carbuncle; namely, that it frequently exists in combination with that form of diabetes in which there is sugar in the urine. The patient is generally in a state of ill health before the carbuncle appears; and often he feels ill, though he hardly knows how to explain in what respect he is so, until the carbuncle shows itself.

Carbuncle, in its commencement, does not always present itself just in the same manner. Generally there is a red cutaneous tubercle, or pimple, which becomes exceedingly painful, resembling a boil, but which, instead of soon terminating

like a boil, goes on increasing in size, becoming
more and more painful, with much induration at
the base. Supposing the disease to be left to run
its course, it will proceed thus : the induration
goes on increasing in degree as well as in extent,
the skin becoming hard and brawny, and of a
dark crimson colour, especially at the centre of
the induration. I have known the induration at
last to occupy a space not less in size than that
of a soup-plate. The patient all this time suffers
exceedingly from a burning pain, with a sense of
weight, constriction, and stiffness. His health is
otherwise deranged, his pulse is frequent, his
tongue furred ; sometimes he is sick, and perhaps
he nauseates his food. In cases that terminate ill,
you will find, after a certain time, when the indu-
ration is very extensive, the pulse becoming weak,
irregular, and intermittent ; there is great prostra-
tion of strength, a hurried manner, delirium, coma,
and this last symptom precedes death. But the
disease may terminate more favourably, even with-
out the aid of surgery. The central part of the
hardness becomes softer ; you can feel an imper-
fect fluctuation under the fingers ; the skin
ulcerates in one small point, then in another, till
you find it perforated in a great number of points,
and a white slough is seen through the perfora-
tions. By and by the intermediate portions of the
skin between these small openings perish and be-
come identified with the slough beneath. There is a
discharge of a small quantity of thin matter, and
a large slough of the cellular membrane is seen
underneath. Sometime afterwards the slough comes

away, consisting of cellular membrane infiltrated with pus and lymph; and then the exposed surface granulates and heals.

But in other cases the disease, in its origin, is somewhat different, showing itself not in the skin, but in the subcutaneous texture. There is a hard lump in the cellular membrane under the skin, which is excessively painful; this goes on increasing till it adheres to the skin; then the skin becomes discoloured, and the disease runs the same course as in the other cases, in which it begun with a red tubercle.

The disease occurs in men more frequently than in women, perhaps because they live on the whole more intemperately. It occurs especially in those who are over-fed with animal food. It is met with more frequently on the back, between the shoulders, than any where else; sometimes on the back of the neck, and sometimes on the occiput. I have observed that when it is on the back of the neck, and especially when it is on the occiput, the disease is very dangerous; but by far the greater number of patients recover in whom the disease is situated elsewhere, and in whom a proper treatment is adopted. The disease is not very common on other parts of the body; I have, however, known it to occur on the nates and thighs, and once upon the face. I was sent for to see a gentleman who was said to be very ill, and when I visited him I could not at first conceive what complaint he had. I never saw such a man's face before, and it took me some time to understand what it was. There was a carbuncle, the

central part of which was on the nose, and you may conceive, better than I can describe, the strange appearance of the human face under such circumstances.

This disease, I have said, occurs in those who have lived very freely, and, like most diseases to which such persons are liable, requires to be treated, not by lowering the patient, but by giving him nourishment, as far as his stomach can digest it; and wine or ale, as far as he can take them without being heated and rendered feverish and irritable. Where there is excessive pain you must administer opium. It is better generally, when the patient is suffering a great deal of pain, to give a good dose of opium at night; but if possible, to avoid giving it in the day-time. There is always a great objection to the exhibition of opium, as it will interfere with digestion and confine the bowels; but there is a still greater objection to the want of sleep, and you must give it as the least of two evils. If you administer any medicine besides, it should be bark, quinine, and other tonics; but I do not think that in general, during the active stage of the disease at least, you will find much good from any thing but nourishment, wine, and opium, with an occasional purgative. The purging, however, should not be carried to an excess. Moderate purgatives, administered at intervals, may be useful and indeed necessary; but a repetition of drastic purgatives will be injurious.

But the principal remedy in these cases belongs to the local treatment. I described to you the disease, supposing it to be left to run its course,

and it is always desirable to know what a disease
will be if you let it alone; but, nevertheless, I do
not advise you to let this alone. Until there is an
opening in the skin, until the pus begins to escape
and the slough is exposed, the brawny hardness
of the skin continues to spread. The slough and
matter require an exit, and you must give them
an exit by making a free crucial incision through
the carbuncle. Make, not a small partial incision
in the middle, but one which extends completely
through the whole brawny tumor, from one side
to the other, and then another at right angles to
the first, also completely through the tumor and
down to the bottom of it. If this be done effec-
tually, and not too early, you will generally find
that the progress of the induration is stopped. If
it should, however, continue to extend, you must
follow it with an incision on another day. These
incisions being combined with good medical
treatment, and attention to the constitution, the
patient generally recovers. In making the incision
you will find that you divide a thick slough of the
cellular membrane, and it has a peculiar appear-
ance, as I have already explained, in consequence
of its being infiltrated with lymph and pus, so that
when it comes away it is more than the mere
destruction of the living parts will account for.
After you have made the incisions you may apply
a poultice to the part, and change it three or four
times daily. It is not uncommon to apply some
digestive ointment, such as used to be called
basilicon, or the *unguentum elemi compositum ;* it
being supposed that this favours the separation of

the slough.   I do not know whether such applica-
tions have this effect or not ; perhaps they may ; at
any rate, they can do no harm. When the sloughs
are separated, the patient's system will be
relieved ; but he will require support, both from
food and medicine. If they were not useful before,
he will now derive benefit from tonics, especially
from bark.   Although I much doubt the efficacy
of these remedies in the early stage of the disease,
I have no doubt they are very efficient and very
useful at this period, when the sloughs have
separated.

   M. Dupuytren says that there are elongations
of the subcutaneous cellular membrane which
extend into the skin, and that when one of these
becomes inflamed it forms a boil, but if several be
inflamed they form a carbuncle.   It may be so ;
the disease may begin in the elongations of the
cellular membrane of which he speaks, as far as I
know.   But there is something more than this.
I do not believe a carbuncle to be a mere local
affection ; it is a constitutional disease, and is
always preceded by something wrong in the
general health.   It seems to me as if there were
something like a poison in the circulation, which
is thrown out of it into the cellular membrane in
cases of carbuncle, so that we might be justified in
classing this disease with small pox and the other
exanthemata.   In a case of small-pox, there is
first an attack of fever, which is relieved as soon
as the pustules appear ; and as these contain the
variolous poison, there is little reason to doubt
that it is the expulsion of the poison from the

circulation that relieves the fever. The case which I am about to relate seems to indicate that something like this happens in cases of carbuncle. A gentleman, an old acquaintance of mine, formerly a surgeon of eminence in a provincial town, but who had retired from his profession, about sixty-three or sixty-four years of age, called upon me some years ago, at my own house, in the morning, and said he had a complaint in his back, and that he suffered a great deal of pain. On examination I found that there was a carbuncle. I sent him home, having told him to poultice it. Two or three days afterwards, it being, as I supposed, in a proper state for the operation, I made a crucial incision through it. He was very much relieved, and was going on very well, when there appeared another carbuncle, but on a smaller scale than the first. It was not a pimple in the skin, but the subcutaneous form of the disease, which I have already mentioned. I told him what I believed to be the case. He said that it did not give him a great deal of pain, and I therefore thought it would be better to let it advance a little further before I opened it. It went on increasing, the skin over it became purple, and it was assuming the ordinary appearance of carbuncle. In the meantime he continued well in health, and appeared indeed to have scarcely any ailment, except the local complaint. But a day or two afterwards, on calling upon him, and believing that it would now be right to incise the tumor, I found him in bed. On inquiring the cause, he said in a faint voice, " Oh! my dear friend, I am dying." I expressed

a hope that that was not the case. "Oh, yes," said he, "I am dying." I found that indeed his words were true. His skin was cold and clammy, and the pulse scarcely perceptible. I asked him how long he had been in that state. His answer was, "During the night, all the pain subsided, and "at the same time I became ill. I believe the "carbuncle itself has disappeared;" and so it had. When I examined the back I could find scarcely a vestige of it. He died in less than twenty-four hours after this change had taken place.

Another circumstance is worthy of notice, as confirming the view which I have taken of the pathology of this disease. It frequently happens, when a patient has recovered from a large carbuncle, that other smaller ones, like boils, appear on different parts of his body; and a succession of these, gradually becoming smaller and smaller, may continue for many months, or even for one or two years.

LECTURE XXI.

ON CHRONIC ABSCESS OF THE TIBIA.

I NEED not tell you that bones are organized like
soft parts; that they have the same apparatus of
arteries, veins, nerves, and cellular tissue, and
that they have, superadded to these, the unor-
ganized phosphate of lime.   Having the same
tissues as the soft parts, they are liable to very
much the same diseases.   But the characters of
these diseases, their symptoms, progress, and treat-
ment, are much modified by the presence of the
unyielding earthy material which I have men-
tioned.   Inflammation takes place in bones as it
does elsewhere; it goes on to suppuration, and
abscess forms in their interior, as in the interior
of other organs.   But there are these points
of difference: an abscess formed in a bone cannot
very readily come to the surface, so that it may
remain pent up for an indefinite period.   Then
the soft parts will stretch, bones will not; and the
consequence is, that an abscess situated in the
latter is attended with much greater pain than
that which occurs in the former.   The patient's
sufferings are consequently more severe, and they
are protracted for a very much longer period.

An abscess may occur in the interior of any
bone in the body, but, according to my experience,

we meet with it more frequently in the tibia than in any other. For reasons which you will understand presently, an abscess in the tibia has especial claims on the attention of the practical surgeon, and these considerations have led me to take this disease as the subject of the present lecture.

It was as long since as the year 1824, that I was consulted by a young man, twenty-four years of age, under the following circumstances :—There was a considerable enlargement of the lower end of the tibia, but the ankle joint admitted of every motion, and was apparently sound. The skin was thin, tense, and closely adherent to the periosteum. There was constant pain in the part, generally of a moderate character, but every now and then it became excruciating, keeping the patient awake at night, and confining him to the house for many successive days. It made his life miserable, and his nervous system irritable; one effect of which was, that it spoiled his temper, and thus produced another set of symptoms in addition to those which were the direct consequences of the local malady. The disease had been going on for twelve years. He had consulted many surgeons respecting it, and had used a great variety of remedies, but had never derived benefit from any thing that was done. Instead of getting better, he every year became so much worse. I tried some remedies without any advantage, and at last recommended that he should lose the limb. Mr. Travers saw the patient with me, and agreed in this opinion. Amputation was performed ; and the amputated tibia is now on the table. You

will see how much the lower end of it is enlarged, and that the surface of it presents marks of great vascularity. The bone in the preparation is divided longitudinally, and just above the articulating surface there is a cavity as large as a small chesnut. This cavity was filled with dark-coloured pus. The inner surface of it is smooth. The bone immediately surrounding it is harder than natural. The examination of the limb explained all the symptoms. The abscess of the tibia was constantly stretching the bone in which it was formed, or rather, if I may use the expression, trying to stretch it, and thus caused the violent pain which the patient suffered. On observing these appearances, I could not help saying, that if we had known the real nature of the disease, the limb might have been saved. A trephine would have made an opening in the tibia, and have let out the matter. It would have been merely applying the treatment here that we adopt in cases of abscess elsewhere. You open a painful abscess of the arm with a lancet; you cannot open an abscess of the bone with a lancet, but you may do so with a trephine.

About two years after the occurrence of this case, I was consulted by another patient, twenty-three years of age, who had an enlargement of the upper end of the tibia, extending to some distance below the knee. He suffered a great deal of pain; the part was very tender, and there were all the symptoms of chronic periostitis. I made an incision over the part, dividing every thing down to the bone, and found the periosteum very much

thickened. There was a new deposit of bone under the periosteum, softer than the bone of original formation. This operation, as in other cases of chronic periostitis, relieved the tension and the pain, and the patient was supposed to be cured. However, about a year afterwards, in August 1827, there was a recurrence of the pain; the enlargement of the tibia, which at first had in some degree subsided, had returned, and it continued to increase. In the enlarged tibia there was one spot a little below the knee, where there was exceeding tenderness on pressure. I need not describe the symptoms more particularly; it is sufficient to say, that they bore a very close resemblance to those in the last case; the only difference being, that as the disease had been of shorter duration, the pain was less severe, and that the tibia was affected in the upper instead of the lower extremity. I concluded that there must be an abscess in the centre of the bone, and applied the trephine to the tender spot. I used the common trephine made for injuries of the head, which, having a projecting rim or shoulder, would penetrate only to a certain depth. However, it enabled me to remove a piece of bone of sufficient thickness to expose the cancellous structure. Then with a chisel I removed some more of the bone. Presently there was a flow of pus in such quantity as completely to fill the opening made by the trephine and the chisel. It seemed as if the bone had been, to a certain extent, kept in a state of tension by the abscess, and that, as soon as an opening was made into it, it contracted and forced

up the matter.   The patient was well from that
time ; the wound healing very favourably, and he
has never had any return of the disease.

Some time after this I was consulted by another
patient, who had an enlargement of the lower end
of the tibia.   He suffered constant pain, but every
two or three weeks there was an exacerbation of
it, and it was then very excruciating, almost in-
tolerable.   These attacks sometimes lasted two
or three hours ; sometimes one or two days.   This
gentleman, when he came under my care, was
thirty-four years of age.   He traced the disease
back for eighteen years, and stated that it began
in the following manner : on going to bed one
evening, he felt a sudden pain in or just above the
ankle-joint ; the next day there was a swelling in
this situation ; he was laid up with inflammation,
and two abscesses burst in succession, but after-
wards healed.   He continued well for some con-
siderable time, and then he was again seized with
pain in the ankle.   This pain was not constant,
but occurred at intervals.   Sometimes there were
several months during which he was quite well.
(These points are worthy of notice with respect to
the diagnosis, as I shall show you presently.)
After some years, however, the pain was never
absent, and he fell into the state in which he was
when he sought my advice.   On examining the
ankle I found the tibia considerably enlarged.
The motion of the joint was perfect, but there was
one tender spot on the inside of the bone that
seemed to indicate the seat of an abscess.   I ap-
plied a trephine here, and penetrated into a cavity

large enough to receive the end of the finger. There gushed out a quantity of matter, perhaps a drachm, or more. The inner surface of the cavity was exceedingly tender, so that the introduction of the finger, or even of a probe, could scarcely be borne. On the following day there was a good deal of inflammation in the neighbourhood of the part in which the operation was performed ; and in the course of a few days more an abscess formed, which burst externally just below the ankle. This was followed by some other collections of matter, apparently on the surface of the bone, but they all healed without any exfoliation. The opening made by the trephine became filled up with granulations, and the wound healed favourably. This took place many years ago ; I have seen the patient every now and then since, and he has continued perfectly well.

I have had two cases of this kind under my care in this hospital. One was a boy, who had a considerable enlargement of the lower end of the tibia, attended with a great deal of pain. I trephined the bone, and let out nearly half an ounce of matter. The relief was immediate, and the patient recovered without any untoward symptoms. The other patient was a man, whose case I will give you a little more in detail from the notes before me. He was admitted in October 1838, being then twenty-four years of age. There was an enlargement of the upper end of the tibia, extending to the distance of two and a half inches below the knee. The circumference of the leg at this part was about an inch more than that of the leg of

the other side. The skin over the enlarged bone was tense, and there was a blush of dark redness on the inside. He said that six years ago there took place some enlargement of the head of the tibia, attended with a dull pain. Leeches were applied, and some other treatment was had recourse to,—I know not what. The pain continued for about six months ; it then subsided, and he became quite free from it, until about three months before he came to the hospital, when it returned, and the bone began to enlarge. The pain at the time of his admission was so severe that he could not sleep at night. It affected his health ; he had lost flesh, and could take little or no food. I concluded that there was probably an abscess in the tibia, but as the disease had been only of short duration, I thought it might be better to treat it as if it were merely chronic inflammation in the first instance, and have recourse to some other remedies before I performed the operation. I prescribed, therefore, calomel and opium, sarsaparilla, and iodide of potassium, one after the other. At last, there being no amendment, I applied the trephine on a part in which the bone appeared more tender than elsewhere, and thus exposed an abscess, which contained two or three drachms of pus. The relief was immediate, and soon afterwards the patient left the hospital cured.

The following case has occurred in my practice, lately. In the year 1841, a young lady consulted me on account of pain in the lower end of the tibia. It had begun in the spring of 1835, when she had an attack of what appeared to be inflammation in

that bone.   The pain was at first confined to the
lower end of the tibia; but, afterwards, she had, in
addition to it, other pains, apparently of a nervous
character, extending up the limb to the hip.   She
was of an hysterical constitution, which might,
perhaps, make the diagnosis of the disease a little
more difficult, the hysterical pain being mixed up
with the other.   However, I found her having
occasional attacks of most severe pain in the lower
end of the tibia, the bone being enlarged and
tender to the touch; and, after a most careful
examination, I was satisfied that there must be an
abscess in the interior of the bone.   Accordingly,
I recommended the application of the trephine.
She could not then stay in London; and as her
surgical attendant in the country did not accord
with me in opinion, the operation was not per-
formed.   She dragged on a very uncomfortable
existence for four years more.   In the interval she
was married, travelled abroad, had various opinions,
and tried different remedies, both here and on the
continent, but obtained no relief.   Last August
(1845) she again came under my care, the tibia
being still further increased in size.   At times she
was quite free from pain; at other times she had
severe attacks of it, so that she could not sleep at
night.   I was still of opinion that there was a
collection of matter within the tibia.   Mr. Travers
and Mr. Key saw the patient with me, and it was
agreed that I should perforate the bone with the
trephine.   Accordingly, I performed the operation.
The bone was excessively vascular, so that there
was a good deal of bleeding ; and, towards the end

of the operation, a quantity of what appeared to be sero-purulent fluid gushed out from beside the trephine, mixing with the blood. At the bottom of the bone removed by the instrument there was a cavity that would just receive the end of the finger, and from which the fluid had escaped. After this she had considerable pain for some time, but evidently of an hysterical character. She went into the country; but I have lately seen her in London, and have been gratified by finding that she is free from all her former symptoms. The wound has been for some time healed, and the lower end of the tibia is already reduced to its natural size. The piece of bone that was taken away is upon the table; it is more hard and compact than it ought to be just above the ankle, where, in the natural state, there is a cancellous structure. You will perceive on its under surface one corner of the cavity in which the sero-purulent fluid was lodged, presenting a smooth surface.

Since I first published some account of this operation in the Medico-chirurgical Transactions, it has been successfully performed by Mr. Liston on a private patient, whom I saw in consultation with him; and also on a patient in University College Hospital. It is satisfactory to know that this simple method of treatment has already preserved many limbs which must have been sacrificed otherwise, and it cannot be doubted that it will be the means of preserving many more, when it is more generally adopted by those who are engaged in operative surgery.

And now the following important questions present themselves. What are the circumstances that would lead you to suspect the existence of abscess in the tibia? And supposing it to be probable that such an abscess exists, what are the exact steps of the operation to be performed for its relief?

When the tibia is enlarged from a deposit of bone externally—when there is excessive pain, such as may be supposed to depend on extreme tension, the pain being aggravated at intervals, and these symptoms continue and become still further aggravated, not yielding to medicines, or other treatment that may be had recourse to, then you may reasonably suspect the existence of abscess in the centre of the bone. You are not to suppose that there is no abscess because the pain is not constant; on the contrary, it very often comes on only at intervals, and in one of the cases which I have related there was, as I then mentioned, an actual intermission of seven or eight months. After the disease has existed a certain number of years, indeed, the pain never entirely subsides, but still it varies, and there are always periods of abatement and of exacerbation. The combination of circumstances which I have described will fully justify you in making an opening into the bone with a trephine. But how will it be if you are mistaken? This will not often occur; but if it should, the taking out a circle of bone can be of no consequence; no injury follows the operation: it is unattended with danger. The operation itself is

very simple. You expose the surface of the bone, and make a circular opening with a trephine at that part where there seems to be some tenderness and some pain on pressure. One principal thing to be attended to is that you have a proper trephine. You do not want so large an one as for the cranium, and it must be somewhat differently constructed. Those which lie on the table are made for the purpose. One is of very small diameter, but, generally, it is quite sufficient. The common trephine is made with a projecting rim or shoulder, and if there be much enlargement of the bone, it will not penetrate deep enough to reach the abscess. It is true that you may break away the bone afterwards, by means of a chisel, but the operation may be more easily performed with a trephine having no projection, which will at once penetrate to the abscess, however deep it may be, and render the chisel unnecessary. The after-treatment is as simple as possible. There may be some pain for a day or two, and especially, as in the case I last mentioned, if the patient be an hysterical female, there may be hysterical pain afterwards; but all that is required is to maintain the general health, and lay on some simple dressing. The bone soon granulates, the space is filled up by a sort of fibrous substance, and the wound cicatrises.

But what would happen if you were not to perform the operation? The patient may continue in torture for a great number of years, losing all the best part of his life; or a worse event than that may take place. The preparation which I

show you is one of the oldest in the museum. I attended a patient who laboured under various diseases ; there were tubercles in the lungs and vomicæ, dead bone in the ribs, and some other local complaints which I forget. Besides all this, he had an enlargement of the lower end of the tibia, attended with excessive pain ; pain, indeed, hardly to be borne, which came on in paroxysms lasting for many hours, and then in some degree subsiding. By and by an abscess appeared externally, in the neighbourhood of the enlarged tibia, and then the pain ceased. Under this complication of disease the patient sank, and died ; and on examining the body I found an abscess in the centre of the tibia. One effect of the abscess had been to cause absorption of the cartilage of the ankle-joint. It might have made its way into the joint, but it took another course ; and if you examine the preparation, you will perceive on one side of the tibia a round aperture, by which the matter escaped, and by which the external and internal abscesses communicated with each other. It is plain from this, that such an abscess cannot exist for ever without the joint being endangered. In the year 1830, a young gentleman, about thirteen years of age, came under my care. He had just returned from Paris, where he had had an attack of inflammation of the bone and periosteum of the tibia, for which he had been attended by the late Baron Dupuytren. The inflammation terminated in necrosis. I removed some portions of dead bone ; others exfoliated without any operation ; and for three or four

years pieces of bone continued to come away, none of large size. Among the sinuses that were open, there was one a little below the knee-joint; I could not ascertain whether bone had come from it or not, but it closed; and the patient appeared quite well. In the year 1835 or 1836, however, I was consulted by him again on account of some pain in the upper end of the tibia. Whenever he walked, the knee-joint swelled, becoming full of fluid. I applied leathern splints, kept him quiet, and he seemed to recover. I then left off the splints, and allowed him to walk as usual. The result was, that in the course of two or three days the knee was again filled with synovia. On a blister being applied, the fluid was again absorbed, but re-appeared again on exercise. Taking these circumstances into account, and remembering that there had been pain for some time in the upper end of the tibia, and formerly a sinus leading to the centre of the bone, I thought it very probable that the knee-joint was only secondarily affected in consequence of some disease in the neighbouring portion of the tibia. Mr. Keate and Mr. Liston saw the patient with me, and agreed in the opinion that it would be prudent to perforate the head of the tibia with a trephine. Finding, as well as I could, the most tender spot, I performed the operation, and out gushed three or four drachms of matter. There was no pain afterwards; the wound gradually contracted and healed, and now, when the patient walked, there was no swelling of the knee. The operation was performed in 1837, and I have seen

the patient occasionally ever since, and know that he has had no return of the complaint. But is it possible to doubt that, if the state of things I have described had gone on, the knee-joint must have been destroyed? What would have happened if recourse had not been had to the operation? A case occurred in this hospital, not exactly similar, but sufficiently so to enable me to answer this question. A man of the name of Hendrow was admitted, in February 1837, with the upper end of the tibia enlarged just below the knee-joint. There was an opening leading down to the centre of the bone, and a probe introduced into it came in contact with a piece of bone that appeared to be dead and loose. It was plain that a piece of bone in the centre of the tibia had exfoliated and formed an abscess, which had afterwards made its way externally. But that which renders the case interesting as connected with the present inquiry is this; whenever the patient took exercise there was an accumulation of fluid in the knee-joint, just as in the last case. The swelling disappeared on the joint being kept quiet; and the motion of the joint was perfect, or nearly so. It seemed plain that there was a piece of dead bone in the centre of the tibia, which was somehow or other doing mischief to the knee-joint, and the course to be pursued was not less evident. I applied a trephine so as to enlarge the opening through which the probe had passed. It penetrated into a cavity in which there lay a piece of dead bone, about the size of a horse-bean, which was at once removed. Unfortunately, the poor fellow, whose

health had been in a bad state previously, had an
attack of erysipelas, and died. Of course I did
not neglect to examine the knee-joint, and I have
the notes of the dissection before me. The whole
upper part of the tibia was increased in size from
a deposit of bone on the surface. The cavity from
which the dead bone had been extracted was of
the size of a large cherry, and it had a smooth
internal surface, the bone around it being somewhat
harder than natural. From this a sinus extended
to the knee-joint, and opened into it just at the
anterior part of the spine of the tibia. There was
no suppuration in the joint. The cartilage covering
the head of the tibia in some places was perfect
in its structure, but it existed only in narrow
stripes ; in other parts it had degenerated into a
substance something like condensed cellular mem-
brane ; in others the only vestige of it was a kind
of membrane,—so thin that you could see the bone
through it ; and in other parts the surface of the
tibia was completely exposed, but not carious.
The bone of the tibia was more compact than
under ordinary circumstances. It was curious that
the condyles of the femur had suffered also, though
in a different manner. The bone, instead of being
harder, was softer than natural, so that you might
cut it with a knife. The cartilage adhered imper-
fectly to the bone ; it could be peeled off, and in
some places had begun to ulcerate. The softening
of the condyles of the tibia, I have no doubt, was
the consequence, and not the cause, of the disease ;
for you will observe that all bones in a state of
inaction lose a great part of their phosphate of

lime.   After compound fracture, when the patient
has been long confined, the bones, in some instances,
actually become as soft as a scrofulous bone, so
that you may cut them with a knife.*

The three last cases show that it is not safe to
leave an abscess in the extremity of the tibia
beyond a certain time ; that the joint is always in
danger, and that the perforation of the bone is the
only remedy.   Even if you were mistaken in your
diagnosis no harm can arise from the operation.
Nay, it is a question whether good may not arise,
under certain circumstances, from taking away a
piece of bone, where it is affected with chronic
inflammation, even though there be no abscess.
The following very remarkable case will illustrate
this last observation. A young gentleman, who
lived at Brixton, was brought to me by Mr.Crowdy,
surgeon of that place, with violent pain in the
middle of one arm, the bone itself being enlarged
in the part to which the pain was referred.   Some
remedies were tried, which I need not enumerate,
without any benefit.   The pain continued, and I
began to suspect that there might be an abscess
in the centre of the bone.   Under this impression
I proposed cutting down upon it, and making an
opening with the trephine, so that I might give
exit to the matter, if there were any there.   The
operation was performed ; the trephine penetrated
to the centre of the bone, but no matter escaped.

* In the Dublin Medical Press for December 3, 1845, there
is an interesting account by Mr. Kirby of a case of chronic
abscess of the tibia, which well explains the ravages ultimately
produced by this disease if it be not relieved by art.

I persevered, but still there was no matter, and at last the instrument penetrated completely from one side of the bone to the other. The bone was very hard and compact, and it was as much as the trephine could do to saw it through. I thought that I had made a blunder, and that there being no abscess the operation would not be attended with any benefit. The next morning the patient had an attack of pain almost as severe as before the operation, but it did not last long, and he never had any pain afterwards. The wound healed, the relief was complete, and I heard of him not along ago as having continued quite well. I presume that this was a case of chronic inflammation of the humerus, and that taking out the piece of bone from the centre, probably, partly by relieving the tension, and partly by a discharge of matter from the bone unloading the vessels, accounted for the relief which the patient obtained from the operation.

THE END.